1

Lemonnier [illegible] Atm.

[illegible]

~~[illegible]~~ [illegible]

[illegible]

[illegible]

F. Exner [illegible] Atm [illegible]

1). [illegible]

2) Influenz [illegible] Potential

$$\frac{\Delta V}{\Delta n} = \Big|$$ [illegible] Pot. [illegible]

[illegible] Pot. [illegible]

$V+\Delta V$ [illegible]

V

[illegible] V [illegible] ; 1 D

$1V = 0{\cdot}89\,D \quad = 10^8$ [illegible]

[illegible] O_{ℓ} [illegible] $v = 0$ [illegible] O_{ℓ}

[illegible] Pot. [illegible]

[illegible] $V\,O_{\ell}$ [illegible] V [illegible]

Ermann [illegible] Infl. [illegible]

[illegible] Peltier [illegible]

[illegible]

Dellmann, Palmieri, Secchi

[illegible]

$$V_1 + \frac{e_1}{R} = [illegible] = 0.$$

[illegible]

$$V_2 + \frac{e_2}{R} = 0$$

[illegible] isoliert [illegible]

[illegible]

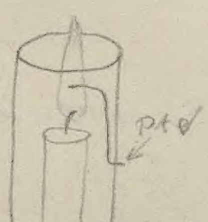
$e_2 - e_1$ [illegible] Elektrometer [illegible]

$$e_2 - e_1 = R\cdot(V_1 - V_2)$$

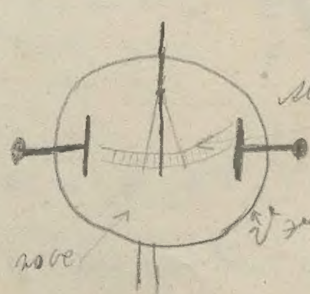
[illegible]

[illegible], [illegible] Elektr., Lunten

Exner'sche Anordnung:



Exner's Elektrometer



Aichung [illegible] gelb. Batterie

[illegible] 200 V ; [illegible]

[illegible] 4

Im Luftballon [illegible] Elektr. [illegible]

[illegible]

[illegible]

[2 [illegible] Elektr.]

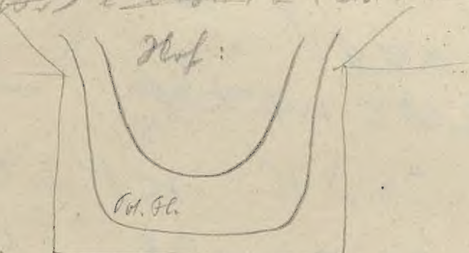
[illegible] 20 m ([illegible] Ballon)

[illegible]

[illegible]

[illegible] Newcastle [illegible]

~~Saussure~~ [illegible]



[illegible]
Schnee:

2 m	20 m	48	[illegible]	68 V.
	15 m	17		32
	10 m	7		11
	5 m	2		5
	0	0		0

[illegible] Felswand:

40 m	[illegible] 0	35 m [illegible]	80 V.
30 m	0		80
25	0		70

[illegible] 100 m:

230 V.

200

150 [illegible] Niveau [illegible]

[illegible] Niveaufläche 0 V.

[illegible] Richtung [illegible]

/IV

[illegible]:

[illegible] [[illegible]

[illegible]

[illegible]

[illegible] Wolfenbüttel

[illegible] 16. [illegible] 2 m

1'03 [illegible] 5 mark [illegible]

[illegible] 5'0 –

[illegible]

[illegible]	[illegible]
Febr.	177
März	2[illegible]
April	[illegible]
Mai	1[illegible]
[illegible]	1[illegible]
Juli	1[illegible]
August	1[illegible]
September	1[illegible]
Okt.	1[illegible]
November	200
Dezember	470

[illegible] 81 [illegible]

Nov 695 [illegible]

[illegible] 2 [illegible]

[illegible]

[illegible] Gruppen

1	2	3	4	5	6	7	8	9	10	11	12	
43	40	[illegible]	40	43	50	57	63	61	55	53	55	M
54	53	54	58	62	6[illegible]	72	71	66	6[illegible]	53	48	A.

Durchschnitt der 1. M. [illegible]

	Morgendämm.	Abend. Dämm.	Früh [illegible]	Mittag [illegible]
[illegible]	$8\frac{3}{4}$ h	7 h	$2\frac{1}{2}$	2 h
[illegible]	$7\frac{1}{2}$	$7\frac{1}{2}$ h	3 h	2 h
				3 h
[illegible]	$7\frac{1}{2}$	8 h	3 h	12 h
[illegible]	8 h	$6\frac{3}{4}$ h	3 h	

[illegible] 3 [illegible]

[illegible]

Wolkenlos [illegible] 220 V. pro 1 m. [illegible]

Wien 140

[illegible]

[illegible]

Ceylon Bombay 55 [illegible]

Sonnblick 1100 [illegible]

Aegypt. Pyramide 1100 [illegible]

Eiffelth. 10000 Vol [illegible]

[illegible]

Palmieri [illegible] Vesuv [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

W. Kohn [illegible] – 1000 V.

[illegible] – 50 V.

[illegible]

[illegible]

5·1 [illegible]	[illegible]
5·2	[illegible]
[illegible]	48

[illegible]

Nolle [illegible]

[illegible]

[illegible]

2/2

$V = \frac{e}{D}$ [illegible]

$V = \frac{e}{R+h}$ $\quad \frac{\partial V}{\partial h} = -\frac{e}{(R+h)^2}$ $\quad = -\frac{e}{R^2} [illegible]$

$V_0 = \frac{e}{R}$ $\quad\quad = -\frac{V_0}{R} [illegible]$

$\frac{\partial V}{\partial h} = -\frac{V_0}{R} [illegible]$

[illegible]

$R.200$ [illegible] $-V_0$

$V_0 =$ [illegible]

$= -130,000000$ Volt

also [illegible]

[illegible]

[illegible]

[illegible]

$V = -\frac{e}{R+h} + \frac{e}{R_2}$ [illegible]

$\frac{\partial V}{\partial h}$ [illegible]

Th [illegible]

— 0'013 Volt

F. Turner

[illegible]

[illegible]

Lecker [illegible]

[illegible]	[illegible]			
2·[illegible]	125	V [illegible]	[illegible]	106
3·8	297		9·5	[illegible]
4·4	197		10·4	84
5·5	166		[illegible]	74
6·8	116		12·5	68

[illegible]

[illegible]

[illegible] $\sigma_0 = \sigma'$

[illegible]

[illegible]

[illegible] $\sigma' = \ell \frac{\partial V}{\partial n}$

$$\frac{\partial V}{\partial n} = -4\pi\sigma_0 + 4\pi\kappa\ell\frac{\partial V}{\partial n}$$

$$\frac{\partial V}{\partial n}\left[1 - 4\pi\kappa\ell\right] = -4\pi\sigma_0$$

$$\frac{\partial V}{\partial n} = -\frac{4\pi\sigma_0}{1 - 4\pi\kappa\ell}$$

[illegible]

$$\frac{\partial V}{\partial n} = \frac{\frac{\partial V}{\partial n_0}}{1 + 4\pi\kappa\ell}$$

[illegible]

[illegible]

28/5

$k = 1\cdot 31$ $\quad \frac{\partial V}{\partial \ldots} = \frac{A}{1+\ldots}$

$A = 1330$

$\left(\frac{\partial V}{\partial \ldots}\right)_{\ldots} = 1310$ $\quad \frac{\partial V}{\partial \ldots} = -116 = \frac{E}{\ldots} = -\frac{V}{\ldots}$

$V_0 = -8 . 10^{?}$ [illegible]

[illegible]

10·4

[illegible]

$A = 1500$ V.

$k = 1\cdot 31$

[illegible]

[illegible] A [illegible]

[illegible] November A 1170 [illegible]

Jänner 2640 Feb.-Apr. 1180

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	42	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	76	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	53	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

V [illegible] $- 6 \cdot 10^8 V$

Theorie von Schrecke

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Theorie von Arrhenius

[illegible]

[illegible]

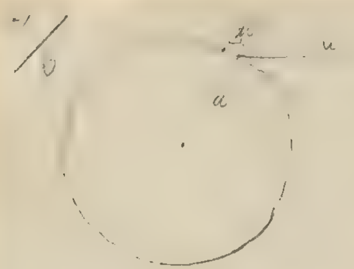
[illegible]

[illegible]

$$\frac{\partial V}{\partial n} = \left(\frac{\partial V}{\partial n}\right)_0 - 4\pi m$$

$$\frac{\partial V}{\partial n_0} = -4\pi\sigma$$

$$\frac{\partial V}{\partial n} = -4\pi\sigma - 4\pi\rho$$



$$U = \int \frac{\sigma\, dO}{u}$$

$V = U - W \qquad W = $ Pot. ...

$$\frac{U_a}{a} + 2\left(\frac{\partial U_i}{\partial r}\right)_{r=a} = 4\pi\sigma$$

... V const. ...

$$U_i + W_i = \text{const} = k$$

$$U_a - W_a = k$$

$$U_0 + W_0 = k$$

$$\frac{\partial U}{\partial r} = -\frac{\partial W}{\partial r}$$

$$U_a = W_0 + U_0 - W_a$$

$$\frac{W_0 - W_a + U_0}{a} - 2\left(\frac{\partial W_i}{\partial r}\right)_{r=a} = 4\pi\sigma$$

$$U_0 = \frac{1}{a}\underbrace{\int \sigma\, dO} = \frac{E}{a}$$

$$4\pi\sigma = \frac{E}{a^2} + \frac{W_0 - W_a}{a} - 2\frac{\partial W}{\partial r}$$

			554
			647
	434		
820			
1120			

[illegible] 159 [illegible]

[illegible] 11 [illegible]

[illegible] 64 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Elster, Geitel

[illegible]

[illegible] ~~8~~ 10^h 12^h 2^h [illegible]

[illegible]

[illegible]

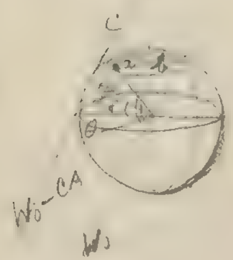
[illegible]

	R Oct.	N.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wolf	0'85	1'17	2'13	1'77	1'5[illegible]	1'2[illegible]	[illegible]	[illegible]	[illegible]
Sonnb.	0'87	0'8[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

$n = 0$

$$\frac{W_a - W_b}{\ldots} = 2\,\frac{\partial W_a}{\ldots}$$

$$= -\frac{E}{A^2} + \ldots + 2\frac{\partial H}{\partial \ldots}$$



$W_0 - CA + c\,p^2$

$p = \overline{bc} - \ldots$

$ab = a\cos\varphi$

$\ldots = a\cos\varphi\sin\theta$

$\overline{bc} = a - a\ldots$

$p = a - a\ldots - a\cos\varphi\sin\ldots\theta$

$W = W_0 - c\,\alpha [\ \ ]$

$W_0 = W_0 - c\alpha [\ \ ]$

$\frac{W - W_0}{\lambda} = -c$

$\frac{\partial W}{\partial i} = -c [\ \ ]$

$\frac{W_0 - W_0}{\lambda} + 2\left(\frac{\partial W}{\partial i}\right)_0 = -3c$

$\left(\frac{\partial V}{\partial r}\right)_0 = -\frac{E}{A^2} - 3c [\ \ ]$

$\theta = 0$

$\left(\frac{\partial V}{\partial r}\right)_0 = -\frac{E}{A^2} - 3c \sin(\varphi - \delta)$

$\varphi = \delta$

$c > 0$

$\phi = 0$

$-3c$

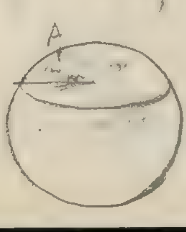
$\# - 3c$

$MN \quad +1c$

♂ ♂ ☿

♅ ♅ ♀ ♀

$= 0$



A1

$W =$

$W = 2\pi \left\{ 1 + \frac{1}{4} p^2 - \dots \right\}$

W

$n = 0$

$-\dfrac{n G \sin\varphi}{2\sqrt{\dots}}$

[illegible]

10

2

[illegible]

$\varphi(u+2\omega) = \varphi(u)$

$\varphi(u+2\omega') = e^{-\frac{i\pi}{\omega}u}\varphi(u)$

$\varphi(\omega+\omega') = e^{-\frac{i\pi}{\omega}(\omega-\omega')}\varphi(\omega-\omega')$

$\varphi(\omega-\omega') = -\varphi(\omega-\omega')$

$$\varphi(u) = \sum_{0}^{n-1} \left[a_n e^{\frac{i\pi}{\omega}(u-\,)} + \frac{i\pi}{\omega} \ldots \theta_{00} \ldots \right]$$

$\tau = \log q$

$\varphi \ldots \theta$.

Ex. $k = 1$, $r = 0$,

$\tau + \log q = 0$

$$q = e^{-\tau} = \frac{1}{\rho}, \quad r = 0$$

$$z = \frac{u\, i\pi}{i\omega}$$

$$\varphi\left(\frac{\omega z}{i\pi}\right) = a_0\, e^{2z + \frac{i\pi}{\omega}} \theta_{00}\, z, \tau$$

$$= a_0 \sum q^{\rho^2} e^{\rho 2z}$$

$$= a_0 \sum_{-\infty}^{+\infty} e^{\rho^2 \tau + 2\rho z}.$$

$$\varphi(u) = a_0 \sum_{\rho=-\infty}^{+\infty} e^{\rho^2 \tau + \frac{i\pi u}{\omega}\rho}$$

$$= 1 + \sum_{\rho=1}^{\infty} e^{\rho^2 \tau} \left(e^{\frac{i\pi u}{\omega}\rho} + e^{-\frac{i\pi u}{\omega}\rho} \right)$$

$$2 \cos \frac{\pi u \rho}{\omega}$$

$\varphi(-u) = \varphi(u)$

$$\psi(n,\dots) = \sum_{-\infty}^{\infty} e^{2\rho n\tau + \rho^2 k\tau - \rho k\tau + \dots}$$

$$+ (\alpha n \rho + \dots)\frac{in\nu}{\omega} - \frac{i\rho}{\omega}(k\rho + n\,) - \rho\frac{\dots}{\omega}$$

$$2\rho n\tau - \rho k\tau +$$

$$2n\tau + \dots + \frac{in\nu\alpha k}{\omega} - \frac{ink}{\omega} - \dots$$

$$\psi(n,\dots) = \sum_{-\infty}^{\infty} e^{\rho^2 k\tau + \alpha k\rho\frac{i\nu}{\omega}} \cdot e^{\alpha\rho\frac{in\nu}{\omega} + \dots}$$

$$k\tau = \tau' \qquad \alpha k\frac{i\nu}{\omega} = 2z$$

$$= e^{\alpha n\frac{in\nu}{\omega} + \frac{in}{\omega}\dots} \sum_{-\infty}^{+\infty} e^{\rho^2\tau' + 2\rho z}$$

$$= \cancel{\psi(\dots)} \qquad \vartheta_{00}(z, \tau')$$

w). $\alpha = 1$

$\mu^{\rho} a_{\rho\kappa} = a_0 \, q^{\kappa\rho(\rho-1)}$

$$\mu\, a_0 = a_{-\kappa}\, q^{2\kappa}$$

$$\mu\, a_{-\kappa} = a_{-2\kappa}\, q^{-4\kappa}$$

$$\mu\, a_{-\rho\kappa} = a_{-\rho\kappa}\, q^{-2\rho\kappa}$$

$$\mu^{\rho} a_0 = a_{-\rho\kappa}\, q^{\kappa\rho \cdots}$$

$2_x = \frac{?}{?}$

$\mu\, a_{2x} = a_x \, q^{2x}$

$\mu\, a_{3x} = a_{2x}\, q^{4x}$

$\mu\, a_{px} = a_{p-1\,x}\, q^{2(p-1)x}$

$\mu^p\, a_{px} = a_0\, q^{2x\,[1+2+\dots+p-1]}$

$\varphi(a) = -2\eta K$

$a = -\frac{\eta K}{2\omega}$

$\lambda = \frac{\lambda - \eta' K}{2\omega'}$

$-\lambda\omega = K(\omega' \eta - \eta' \omega)$

$\lambda = -\frac{K}{\omega}\frac{i\pi}{2}$

$\varphi(u + 2\omega) = \varphi(u)$

$\varphi(u + 2\omega') = e^{2\lambda u} \varphi(u)$

$\varphi(u) = \sum_{-\infty}^{\infty} a_m e^{\frac{m i \pi u}{\omega}}$

$e^{\frac{i\pi u}{\omega}} = \rho$

$= \sum a_m \rho^m$

$$-2\eta'\Sigma\alpha_i + [illegible]$$

[illegible]

$$= 4\,[illegible]$$

[illegible]

$$= 2\,[illegible]$$

[illegible]

$$4a\omega' + [illegible] + 4b[illegible]$$

[illegible]

$$4a\omega' = -2\eta'\alpha + 2\lambda$$

$$a = \frac{-\eta'\alpha + \lambda}{2\omega'}$$

$$= 4a\omega u + 4\omega^2 u + 4bu = (2\rho' + [illegible]) - 2\eta\alpha[illegible] - 2\eta\Sigma\alpha_k$$

$\varphi(u+2\omega) = \sigma u - \ldots$

$$-2\eta\,\Sigma\alpha_k +$$

$$-\wp(u+2\omega)$$

$$= \varphi(u) = \sigma(u\ldots)$$

$(-1)^k = e^{k i\pi}$

$2\eta\, k(u+\omega) - 2\eta\,\Sigma\alpha_k + \wp(u+2\omega) - \wp(u) + 2\nu + 1\ldots$

$2\nu i\pi$

$$\wp''(u+2\omega) = \wp''(u)$$

$\varphi(u+2\omega') = \sigma u -$

$F(u+2\omega) = e^{a \dots} \dots - 4\alpha \omega u + \dots$

$\dots \omega^2 - 2\,\eta\, u - 4\,\eta\, \omega$

$F(u)$

$e^{\dots} F(u+2\omega) = F(u)$

$e^{\dots} : au + b - 4\alpha u - 4\alpha\omega^2 - 4\eta\omega = 2 n i \pi$

$a - 4\alpha\omega = 0$

$\alpha = \dfrac{a}{4\omega}$

$b - 4\alpha\omega^2 - 4\eta\omega = 2 n i \pi$

$F(u+2\omega) = F(u)$

$F(u+2\omega) = e^{Au^2 + Bu + C} F(u)$

$A = 0$

$G(u+2\omega) = e^{2\eta u - \dots} G(u)$ $\qquad \eta = \dfrac{G'(\omega)}{G(\omega)}$

$\varphi(z+2i\pi) = \varphi(z)$

$\varphi(z+2i\pi) =$

$\varphi(u+2\omega) = \varphi(u)$

$\varphi(u+2\omega') = \mu e^{\lambda u}\varphi(u)$

$f(u+2\omega) = f(u)$

$f(u+2\omega) = e^{az+b} f(u)$

$f(u+2\omega') = e^{a'z+b'} f(u)$ $\qquad f(u) = e^{\alpha u^2 + 2\beta u + \gamma} F(u)$

$e^{au+b} f(u) = e^{\alpha(u+2\omega)^2 + 2\beta(u+2\omega)+\gamma} F(u+2\omega)$

$f(u+2\omega) = \qquad = e^{\alpha u^2 + (2\beta + a)u + \gamma + b} F(u)$

[illegible]

$$= \sum e^{\left(\frac{2n+1}{2}\right)^2 \tau + [illegible]}$$

$$= e^{-\frac{\tau}{4}} \sum e^{\left[\left(\frac{2n+1}{2}\right) + \frac{1}{2}\right]^2 \tau + \frac{2n+1}{2} [illegible]}$$

$$= e^{[illegible]} \sum e^{\left[n+1\right]^2 \tau + [illegible]}$$

$$\underbrace{= e^{[illegible]} \vartheta_{10}(z)}$$

ϑ_{0} [illegible] $= \sum e^{[illegible] + 2z + i\pi} =$

$$= \sum e^{[illegible]}$$

$$= e^{[illegible]} = \underline{\vartheta_{11}(z)}$$

$\vartheta_{11}(z - \frac{1}{2}) = i \sum (-1)^n e^{[illegible] + \frac{2n+1}{2}\tau}$

$$= i e^{[illegible]}$$

$$= i e^{-\frac{\tau}{4} \cdot 3} [illegible] \vartheta_{[illegible]}(z)$$

$\vartheta_1 [illegible] = i \sum (-1)^n e^{\left(\frac{2n+1}{2}\right)^2 \tau + [illegible]}$

$$= \underline{-\vartheta_{10}(z)}$$

$$\vartheta_{00}(z+\tfrac{1}{2}\tau) = \sum e^{n^2\tau + 2n\pi + 2nz}$$

$$= e^{-\tau} \quad e^{-2z}$$

$$= e^{-\tau-2z}\,\vartheta_{01}$$

$$\vartheta_{01}(z+\tfrac{1}{2}\tau) = \sum (-1)^n e^{n^2\tau + 2nz + \ldots}$$

$$= -e^{-\tau-2z}\,\vartheta_{01}$$

$$\vartheta_{1,\varrho}(z) = \sum_{-\infty}^{\infty} e^{\left(\frac{2n+\frac{1}{\mu}}{2}\right)^2 \tau + \ldots}$$

$$\vartheta_{\mu,\nu}(z) = \sum_{-\infty}^{\infty} e^{\frac{(2n+\mu)^2}{4}\tau + \frac{(2n+\mu)}{2}\ldots}$$

$= -1)^{\mu\nu}$

$= -1^{\mu\nu}\,\vartheta_{\mu,\nu}(z)$

$$\vartheta_{\mu\nu} = \sum_{-\infty}^{\infty} e^{n^2\tau + n\mu\tau + \mu^2\frac{\tau}{4} + 2nz + \mu z + n\varrho i\pi + \mu\frac{\varrho}{2}\ldots}$$

$$\vartheta_{\mu\nu}(z) = e^{\mu^2\frac{\tau}{4} + \mu z + \frac{1}{2}\mu\varrho i\pi} \sum_{-\infty}^{\infty} e^{n^2\tau + n\mu\tau + 2nz + n\varrho i\pi}$$

$\ldots 2n\varrho\left[z + \frac{1}{2}\mu\tau + \frac{1}{2}\ldots\right]$

$$\vartheta_{10}(z) = e^{z + \frac{\tau}{4}}\, \vartheta_{00}\left(z + \tfrac{1}{2}\tau\right)$$

$$\vartheta_{10}(z) = A e^{z + \frac{1}{4}\tau} \prod_0^{\infty} \left(1 + \rho^{2n+1} \cancel{\ } e^{2z+\tau}\right)\left(1 + \rho^{\ldots} e^{\ldots}\right) =$$

$$= A e^{z + \frac{1}{4}\tau} \prod_0^{\infty} \left(1 + \rho^{2n+2} e^{2z}\right)\left(1 + \rho^{\ldots} e^{\ldots}\right)$$

$$= A\, e^{z + \frac{1}{4}\tau} \left(1 + e^{-2z}\right) \prod_1^{\infty} \left(1 + \rho^{2n} \ldots\right)$$

$$= A\, \rho^{\frac{1}{4}}\, 2i \cos iz \prod \left(1 - \ldots\right)$$

$$\vartheta_{11}(z)$$

$$\vartheta_{11} = \vartheta_{10}\left(z + \frac{i\pi}{2}\right) = \sum_{-\infty}^{\infty} e^{\frac{2n+1}{2}\tau + \frac{2n+1}{2} \ldots + \frac{1}{2}\pi i}$$

$$=$$

$$A\, e^{z + \frac{1}{2} i\pi + \frac{1}{4}\tau} \prod_0^{\infty} \left(1 - \rho^{2n+2} e^{2z}\right)$$

$$\left[1 - \rho^{2n} e^{-2z}\right]$$

$$f_1 = \ldots \sum_{-\infty} \ldots \rho \ldots 2^{n}$$

$$\ldots f_2 = A_2 \sum_{-\infty}^{+\infty} \ldots \frac{2}{\ldots}$$

$$= \sum \rho^{n^2} e^{2nz} =$$

$$\ldots + 2nz$$

$$\sum_{-\infty}^{+\infty} \ldots \rho^{n^2} e^{2nz} = \ldots \quad \Sigma -1 \ldots$$

$$\ldots \prod (1+\rho^{2n+1} e^{2z})(1+\rho^{2n+1} \ldots)$$

$$\ldots = \prod (1-\rho^{2n} \ldots)$$

$$\ldots \frac{f_2}{2} = \prod_0 \ldots$$

$$= A \prod (1 + \rho^{2n+1} \cos 2iz + \rho^{4n+2})$$

$$A_{0i} = \quad 1 - 2 \ldots$$

$$= A \prod \left[1 - 2 \ldots \cos 2iz + \rho \ldots\right]$$

$\vartheta(z) = \sum_{-\infty}^{\infty} e^{n^2\tau + 2nz} = A\ldots$

$\vartheta_{01}(z) = \sum_{-\infty}^{\infty} (-1)^n e^{\ldots - 2nz} = A\ldots$

$V = \prod_0^{\infty} (1 + q^{2n+1} \ldots)$

$\prod (1 + q^{\ldots} e^{-2z})$

$1 + q^{2n+1}\left(e^{2z} + e^{-2z}\right) + q^{4\ldots}$

$\ldots iz$

$= \prod (1 + \ldots^{2\ldots})$

$\vartheta = \prod (1 - 2q^{2n\ldots} \ldots)$

$\vartheta_{10}(z) \ldots z + \frac{\tau}{2} \ldots \times e^{\ldots\frac{\tau}{4}}$

$\vartheta_{11}(0) \ldots = .$

34

$$b_0 = -b_1 \rho^{-1} \qquad b_{-n} = -b_{-n-1}\rho^{-n-1}$$

$$b_1 = -b_0 \qquad b_{-n-1} = -b_{-n-2}\rho^{-n-2}$$

$$b_2 = -b_1 \rho$$

$$b_{-1} = b_{-2}\rho^{-2}$$

$$b_n = -b_{n-1}\rho^{n-1}$$

$$b_n = (-1)^n \rho \rho^2 \rho^{n-1} b_0$$

$$b_n = (-1)^n \rho^{\frac{n(n+1)}{2}} b_0$$

$$b_{-n} = (-1)^n \rho^{\frac{n(n-1)}{2}} b_0$$

$$f(z) = b_0 \sum_{n=-\infty}^{+\infty} (-1)^n \rho^{\frac{n(n-1)}{2}} z^n$$

$$f(\rho z) = b_0 \sum (-1)^n \rho^{\frac{n(n+1)}{2}} z^n$$

$$= b_0 \sum (-1)^n \rho^{n^2} \left(\frac{z}{\rho}\right)^n$$

$$-\frac{z}{\rho} = e^{2z}$$

$$\frac{z}{\rho} = e^{2z}$$

$$\log q = \tau$$

$$q = e^{\tau}$$

$$f(\rho z) = w(\rho z)\, w\left(\tfrac{1}{z}\right) = \frac{w(z)}{1-z}\, w\frac{1}{z}$$

$$= -\frac{f(z)}{z}$$

$f(z) = -2 f(\rho z)$

$f(z) =$ 1

drugen 3 M

5 $(1-z)\, w\, \rho z$

$f(z) = w(z)\, w\frac{1}{z}$

$f(\rho z) = w(\rho z)\, w\left(\frac{1}{z}\right)$

$$\frac{w(z)}{1-z}\ \frac{z-1}{z}\ w\frac{\rho}{z} = -f(z) \qquad f(z) = -2 f(\rho z)$$

$$f(z) = \cdots + \frac{b_{-1}}{z} + b_0 + b_1 z + b_2 z^2 \cdots$$

$$f(\rho z) = \cdots - \frac{b_{-n}}{z^n \rho^{-n}} + \cdots + b_0 + b_1 \rho z + b_2 \rho^2 z^2 \cdots$$

$= A_0 + A_1 z \dots$

$A_0 + A_1 z + A_2 z^2 \dots$

$= A_0 + A_1 \rho z + A_2 \rho^2 z^2 \dots$

$- A_0 z - A_1 \rho z^2 - A_2 \rho^2 z^3 \dots$

$A_0 = A_0$

$A_1 = \dots$ $\qquad A_1 = \frac{A_0}{\rho - 1}$

$A_2 = \dots$ $\qquad A_2 = \frac{A_1 \rho}{\rho^2 - 1} = \frac{A_0 \rho}{(\rho^2 - 1)(\rho - 1)}$

$A_3 = A_2 \rho^2 \dots$ $\qquad A_3 = \frac{A_2 \rho^2}{\rho^3 - 1} = \frac{A_0 \rho^3}{(\rho^3 - 1) \dots}$

$A_0 = 1$

$A_n = \dots$

Θ Function

$\pm 2 \pm 1 \quad 0 \quad +1 \quad 2$

$a, \; a\varphi, \; a\varphi^2$

$f(u) = \left(1-\frac{u}{a}\right)\left(1-\frac{u}{a\varphi}\right)\left(1-\frac{u}{a\varphi^2}\right)\cdots$

$\frac{1}{a} + \frac{1}{a\varphi} + \frac{1}{a\varphi^2} \cdots$

$= \frac{1}{|a|}\left[1 + \frac{1}{\rho} + \frac{1}{\rho^2} + \cdots\right] = \frac{1}{\cdots} \quad |\rho| > 1$

$\frac{u}{a} = z \qquad \frac{1}{\varphi} = \rho$

$(1-z)(1-\rho z)(1-\rho^2 z)\cdots$

$\wp'(u)^2 \cdot \sigma_3(u)^2 + $ [illegible]

$\frac{\sigma_1(u)^2}{\sigma_3} - 1 = \frac{(e_1 - e_3)}{(e_2-e_3)}$ [illegible]

$\left(\frac{\sigma_1 u}{\sigma_3 u}\right)^2 = 1 - $ [illegible] $\sin^2 \mathrm{am}$ [illegible]

$= \mathrm{cn}^2 \mathrm{am} \sqrt{e_1 - e_3} \cdot k$

$\sigma_2(u)^2 - \sigma_3(u)^2 \ldots = 0$ [illegible]

$\left(\frac{\sigma_2 u}{\sigma_3 u}\right)^2 - 1 = \frac{(e_2 - e_3)}{e_1 - e_3} \sin^2 \mathrm{am} \left(\sqrt{e_1 - e_3}\, u, k\right)$

k^2

$\left[\frac{\sigma_2(u)}{\sigma_3(u)}\right]^2 = 1 - k^2 \sin^2 \mathrm{am} \left(\sqrt{e_1 - e_3}\, u\right)$

[illegible]

Consider

$K = \int_0^1 \frac{dt}{\sqrt{1-t^2}\,\sqrt{1-k^2t^2}}$ [illegible]

$\left[\frac{\sigma_i u}{\sigma u}\right]^2 = \wp u - e_i$

$\left(\frac{\sigma_3 u}{\sigma u}\right)^2 = \wp(u) - e_3$ $v = \frac{\omega}{2}$

$\frac{\sigma_3(\omega_1)}{\sigma(\omega_1)} = \sqrt{e_1 - e_3}$

$\left(\frac{dz}{du}\right)^2 = \left[1 - (e_1 - e_3) z^2\right]\left[1 - (e_2 - e_3) z^2\right]$

[illegible]

$\alpha = 3$

$\beta = 2$

$\gamma = 1$

$\left(\frac{dz}{du}\right)^2 = \left[1 - (e_2 - e_1) z^2\right]\left[1 - (e_3 - e_1) z^2\right]$

$\sqrt{e_1 - e_3}\, z = \zeta$

$\frac{1}{e_1 - e_3} \left(\frac{d\zeta}{du}\right)^2 = \left[1 - \underbrace{\frac{e_2 - e_3}{e_1 - e_3}}_{k^2} \zeta^2\right]\left[1 - \zeta^2\right]$

$\frac{e_2 - e_3}{e_1 - e_3} = k^2$

$\left(\frac{d\zeta}{d\underbrace{\sqrt{e_1 - e_3}\, u}_{v}}\right)^2 = \left[1 - k^2 \zeta^2\right]\left[1 - \zeta^2\right]$

$\left(\frac{d\zeta}{dv}\right)^2 = \left[1 - k^2 \zeta^2\right]\left[1 - \zeta^2\right]$

[illegible]

$\zeta = \sin \operatorname{am} v$

$= \sqrt{e_1 - e_3}\; X_{0a}$

$\frac{\sigma u}{\sigma_3 u} = \frac{1}{\sqrt{e_1 - e_3}}$ [illegible] $\frac{1}{\sqrt{e_1 - e_3}}$ [illegible] $(\sqrt{e_1 - e_3}\, u, k)$

[illegible]

[illegible]

[illegible]

$\sigma_\nu(-u) = \sigma_\nu(u)$

$\sigma_1(u)\,\sigma(u) \ldots$

$\sigma_1 u \ldots$

$\sigma_1^2(u) = p(u) - \ldots$

$\frac{\sigma_1 u}{\sigma u} = \sqrt{p\,u - e_1}$

$\frac{\sigma_2 u}{\sigma u} = \sqrt{p\,u - e_2}$

$\frac{\sigma_3 u}{\sigma u} = \sqrt{p\,u - e_3}$

$p\,u = \frac{1}{3}\,\frac{\sigma_1^2 u + \ldots}{\sigma^2 u}$

$4\left[\frac{\sigma_1 u\,\sigma_2 u\,\sigma_3 u}{\sigma^6 u}\right]^2 = p'(u)^2$

$p'u = \pm\,\frac{2\,\sigma_1 u\,\sigma_2 u\,\sigma_3 u}{\sigma^3 u}$

$p\,u = \frac{1}{u^2} + \ldots$

$p'(u) = -\frac{2}{u^3} + \ldots$

$\sigma\,u = u + \ldots$

$\sigma_\nu u = 1 + \ldots$

Periodi

$\sigma_1(u + \omega) = \pm\,\sigma_1 u\,\sigma u$

$\sigma_1(u+\omega) = \mp\, e^{\eta \ldots}$

[illegible]

$\lambda = \frac{1}{[illegible]}$ $\quad = ([illegible])$

[illegible]

$\sigma(u + \frac{\omega}{2})$ $= \sigma(u - \frac{\omega}{2} + [illegible])$

$= - e^{[illegible]} \sigma(u - [illegible])$

$\frac{[illegible]}{\sigma\frac{\omega}{2}} = \frac{e^{[illegible]}\,\sigma([illegible])}{\sigma\frac{\omega}{2}}$

[illegible] $\quad C, \; [illegible]$

σu [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$G_1(u) =$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$= A_1$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$+$ [illegible]

[illegible] $\equiv$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] [illegible]

[illegible] 60

Dutch [illegible]

[illegible]

[illegible]

$12\frac{1}{2}$ [illegible]

Turnik

[illegible]

$7\frac{3}{4}$ [illegible]
[illegible]

$$p\,u = \ell \alpha \ldots \frac{\ldots}{6\,u}$$

$$p' \ldots = -2\,\ell \alpha \ldots \frac{\ldots}{6^3 u}$$

$$6\,u \ldots - \ldots + \ldots$$

$$x_\alpha - \ldots \; y \ldots - \ldots$$

$$\ldots \qquad \frac{p}{q} \qquad X_\beta - \ldots$$

$$X_{\alpha 0}^{\,2} = p \ldots$$

$$2\,X_{\alpha 0} X'_{\alpha 0} = p' \ldots = -2\,X_{\alpha 0}\, Y_{\beta 0} \ldots$$

I. $X'_{\alpha 0} = -\,X_{\beta 0}\, Y_{\beta 0}$

$$X_{\beta} = \frac{X_{\beta 0}}{Y_{\beta 0}} \qquad Y_{\beta} = -\,\frac{\ldots}{Y_{\beta}}$$

$$= \frac{-\,X_{\alpha 0} Y_{\beta 0}^{\,2} + X_{\beta 0}^{\,2} Y_{\alpha 0}}{Y_{\beta 0}^{\,2}}$$

III. $= X_{\alpha 0} \left(\ldots - \ldots \right)$

$$6_{\rho o}^{2} - 6_{\gamma o}^{2} + (e_\rho - e_\gamma)(\ldots) = 0$$

$$X_{\rho o}^{2} - X_{\gamma o}^{2} = -(e_\rho - e_\gamma)$$

$$\mathrm{II}\ X'_{\rho\gamma} = -\underline{(e_\rho - e_\gamma) X_{o\rho}}\, X_{o\gamma}$$

$$X_{o\alpha} = \frac{1}{X_{\alpha o}}$$

$$\mathrm{I}\ X'_{\rho\alpha} = \frac{-X'_{\alpha o}}{X_{\alpha o}^{2}} = \frac{X_{\rho o} X_{\gamma o}}{X_{\alpha o}} = X_{\rho o} X_{\rho \alpha}$$

$$-\partial X'_{\ldots} X_{\alpha o} X_{\alpha}^{\ldots}$$

$$X'^{2}_{\alpha o} = X_{\rho o}^{2} X_{\gamma o}^{2}$$

$$6_{\alpha o}^{2} - 6_{\rho o}^{2} = + [e_\alpha - e_\rho](\ldots) = 0$$

$$X_{\rho o}^{2} = X_{\alpha o}^{2} + (e_\alpha - e_\rho)$$

$$X_{\gamma o}^{2} = X_{\alpha o}^{2} + (e_\alpha - e_\gamma)$$

$$X'^{2}_{\alpha o} = [e_\alpha - e_\rho + X_{\alpha o}^{2}][e_\alpha - e_\gamma + X_{\alpha o}^{2}]$$

$$X'^{2}_{\rho\gamma} = (e_\rho - e_\gamma)^{2} X_{o\rho}^{2} X_{o\gamma}^{2}$$

$$\sigma_{\beta\alpha}^2 - \sigma_{\gamma\alpha}^2 + [\ell_\beta - \ell_\gamma] \ldots = 0$$

$$X_{\beta\gamma}^2 - 1 + [\ell_\beta - \ell_\gamma]\, X_{\beta\gamma}^{2}$$

$$= [\ell_\beta - \ell_\gamma]\, X_{\beta\gamma}^2 + 1 - X_{\beta\gamma}^2$$

$$[\ell_\alpha - \ell_\beta]\, \sigma_\gamma{}^2 - [\ell_\beta - \ell_\gamma]\ldots$$

$$[\ell_\alpha - \ell_\beta] + [\ell_\beta - \ell_\gamma]\, X_{\alpha\gamma}^2 + [\ell_\gamma - \ell_\alpha]\, X_{\beta\gamma}^2 = 0$$

$$[\ell_\beta - \ell_\gamma]\, X_{\alpha\gamma}^2 = [\ell_\beta - \ell_\alpha] + [\ell_\alpha - \ell_\gamma]\, X_{\beta\gamma}^2$$

$$\downarrow$$

$$X'_{\beta\gamma}{}^2 = [1 - X_{\beta\gamma}^2][\ell_\beta - \ell_\alpha + [\ell_\alpha - \ell_\gamma]\, X_{\beta\gamma}^2]$$

$$X'_{0\alpha} = X_{\beta\alpha} X_{\gamma\alpha}$$

$$X'_{0\alpha}{}^2 = X_{\beta\alpha}^2 X_{\gamma\alpha}^2$$

$$\sigma_{\alpha\beta}^2 - \sigma_{\beta\alpha}^2 + [\ell_\alpha - \ell_\beta]\, \sigma_{0\alpha}^2 = 0$$

$$1 - X_{\beta\alpha}^2 + [\ell_\alpha - \ell_\beta]\, X_{0\alpha}^2 = 0$$

$$X_{\beta\alpha}^2 = 1 + [\ell_\alpha - \ell_\beta]\, X_{0\alpha}^2$$

$$X_{\gamma\alpha}^2 = 1 + [\ell_\alpha - \ell_\gamma]\, X_{0\alpha}^2$$

$$X'_{0\alpha}{}^2 = [1 - [\ell_\beta - \ell_\alpha]\, X_{0\alpha}^2][1 - [\ell_\gamma - \ell_\alpha]\, X_{0\alpha}^2]$$

$X_{\alpha 0} = \sqrt{\ell_\beta - \ell_\alpha}\sqrt{\ell_\gamma - \ell_\alpha}\, 2$

$2 = \frac{X_{\alpha 0}}{\sqrt{\ell_\beta - \ell_\alpha}\sqrt{\ell_\gamma - \ell_\alpha}\, X_{\alpha 0}}$

$- e \quad X_{0\alpha}$

II $X_{0\beta} = \sqrt{\ell_\beta - \ell_\alpha}\, 2$

$X_{0\alpha}(0) = 0$

$= 1$

$\alpha = 3 \quad , \quad \beta = 2$

$\left(\frac{dz}{du}\right)^2 = \left[1-(e_2-e_1)z^2\right]\left[1-(e_1-e_3)z^2\right]$

$z = X_{33}$

$\xi = \sqrt{e_1 - e_3}\, z$

$z = \dfrac{X_{30}}{\sqrt{e_1-e_3}\sqrt{e_1-e_3}}$

$z = \dfrac{X_{21}}{\sqrt{e_1-e_3}}$

$\cancel{\frac{d\xi}{du}(e_1-e_3)} =$

$\dfrac{1}{e_1-e_3}\left(\dfrac{d\xi}{du}\right)^2 = \left[1-\xi^2\right]\left[1-\underbrace{\left(\dfrac{e_2-e_1}{e_1-e_3}\right)}_{=K^2}\xi^2\right]$

$$\frac{1}{\quad} \frac{d}{d} = [1-]^{2}[1-]$$

4-11

$$q = e^{\dots}$$

$$a_{\rho\lambda+\nu} = a_\nu\, q^{2\nu\rho+\rho^2 \dots}$$

$$\vartheta = \sum_{\lambda=0}^{\rho-1} \dots \sum_{-\infty}^{+\infty} e^{\dots}$$

$$\vartheta_{\rho\sigma}(u) = \sum e^{\left(\frac{2n+\rho}{2}\right)^2 \tau + \left(\frac{2n+\rho}{2}\right)(2u+\sigma\pi i)}$$

$$= \sum e^{n^2\tau + \frac{\rho^2}{4}\tau + 2n\rho\tau + 2nu + \dots + \rho u + \dots}$$

$$= \sum_{-\infty}^{+\infty} e^{2\rho r \frac{i\pi \omega'}{\omega} + \rho^2 \dots}$$

$$+ 2 \cdot 2 \rho \kappa \tau$$

$$\frac{i\pi}{\omega} x = \Omega\, 2$$

$$i\pi \frac{\omega'}{\omega} = \tau$$

$$= \sum e^{2\rho n \tau + \rho^2 \kappa \tau - \kappa \rho \tau + 2\rho \dots}$$

$$\tau' = \kappa \tau$$

$$= \sum e^{n^2 \tau' + \frac{2nr}{\kappa} \tau' - n\tau' + 2 \dots n \dots}$$

$$= \sum e^{\left[n^2 + \frac{2nr}{\kappa} - n\right]\tau' + n \dots}$$

$$\sum e^{\left(n^2 + \frac{2nr}{\kappa} + \frac{r^2}{\kappa^2}\right)\tau' - \frac{r^2}{\kappa^2}\tau' + \dots}$$

$$\cancel{2z(n\kappa + r)} + \frac{r\tau'}{\kappa} +$$

$$= e^{-\frac{r^2}{\kappa^2}\tau' + \frac{r\tau'}{\kappa}} \sum e^{\left(n + \frac{r}{\kappa}\right)^2 \tau' + 2z \dots}$$

13

$$f(x,y) - z = 0$$

$$\frac{\partial z}{\partial x} = p \qquad \frac{\partial z}{\partial y} = q$$

$$\frac{\partial^2 z}{\partial x^2} = r \qquad \frac{\partial^2 z}{\partial x \partial y} = s \qquad \frac{\partial^2 z}{\partial y^2} = t$$

$$p(\xi - x) + q(\eta - y) - (\zeta - z) = 0$$

$$\cos \alpha = \frac{p}{\sqrt{1+p^2+q^2}} \qquad \frac{q}{\sqrt{1+p^2+q^2}} \qquad \frac{1}{\sqrt{1+p^2+q^2}}$$

$$dz = p\,dx + q\,dy$$

$(r-t)$

$$\tan 2\alpha = \frac{2s}{r-t}$$

$\frac{1}{R} = r_1$

$\frac{1}{\rho_1} = r_1$ | $\frac{1}{\rho_2} = r_2$

$\frac{1}{D} = \frac{?}{?} + \frac{?}{?}$ [illegible]

[illegible]

$\frac{1}{D'} = \frac{?}{?_1} + \frac{?}{?_1}$

$\frac{1}{R} + \frac{1}{R'} = \frac{1}{?_1} + \frac{1}{?_2}$ [illegible]

[illegible]

[illegible]

$\frac{1}{R'} = \frac{1}{?_1}$ [illegible]

$\frac{1}{?_1} - \frac{1}{?_1} > 0$ $?_1 > ?_1$

R_1 [illegible]

$R_1 - R_2 < 0$

$\frac{1}{F} = \frac{1}{F_2}$ [illegible]

$R_1 - R_1 > 0$ R_1 [illegible]

R_1 [illegible]

$$= \frac{1}{2}$$

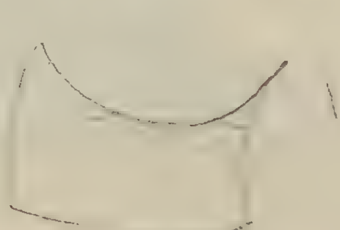
$$= \rho$$

$$R = \frac{\rho^2}{2}$$

$s^2 - rt < 0$ ellipse

$= 0$

> 0



$$\frac{\partial R}{\partial \alpha} \qquad I \qquad II$$

$$I \cos\alpha + II \cos \ldots = 0$$

$$\frac{\ldots}{\ldots} = \frac{I}{II} = \frac{I}{III}$$

R

$$\ldots - \frac{R}{V}[\ldots] = 0$$

$$\ldots - \frac{R}{V}[\ldots] = 0$$

Z

Y

X

$$-dz = dp\,([illegible] - x) + dq\,([illegible] - y) - p\,dx - q\,dy$$

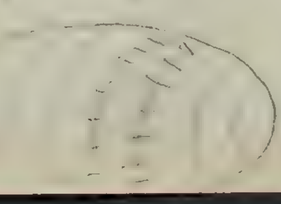
$$0 = dp\,([illegible] - x) + dq\,([illegible])$$

$= d_p \ldots d_q$

$d_p \cos\theta' + d_q \sin\theta' \ldots$

$d_p = r \cos\theta . ds$

$d_q = t \sin\theta\, ds$



[illegible]

$dx\, dx' \ldots + \ldots dy\, dy$ [illegible]

[illegible]

[illegible] $x\, dy' + dx' \ldots = 0$

[illegible]

[illegible]

$\xi = x + l$ [illegible]

$\eta = y + l$ [illegible]

$\zeta =$ [illegible]

[illegible] $dx + l' d$ [illegible]

$0 =$ [illegible] $dx + l'$ [illegible]

$0 =$ [illegible] $+ l'$ [illegible]

$0 =$ [illegible] $+ l'$ [illegible]

[illegible]

$$\begin{vmatrix} dx & dy & \text{[illegible]} \\ \text{[illegible]} & \text{[illegible]} & \text{[illegible]} \\ \text{[illegible]} & \text{[illegible]} & \text{[illegible]} \end{vmatrix} = 0$$

[illegible]

[illegible]

[illegible]

$dz = $ [illegible]

$$0 = \frac{dx}{l}\left(\frac{1}{l} u_1\right) - \frac{d}{l} [illegible]$$

$$+ \frac{l^2 - l}{l^2}\, u$$

$$0 = dx\, v_1 + dy\, (\ldots) + dz\, v_3 +$$

$$+ \frac{l^2 - l}{l^2}\, v$$

$$0 = dx\, w_1 + dy\, v_2 + \frac{1}{l} [illegible]$$

$$+ \frac{l^2 - l}{l^2}\, w$$

[illegible]

$$0 = dx\, u + dy\, v + dz\, w$$

[illegible]

[illegible]

[illegible]

[illegible]

$$\begin{vmatrix} dx & dy & dz \\ p & q & -1 \\ dp & dq & 0 \end{vmatrix} = dq\,[p\,dz + dx] - dp\,[q\,dz + dy] = 0$$

$$\frac{dq}{q\,dz + dy} = \frac{dp}{p\,dz + dx} \qquad dz = p\,dx + q\,dy$$

$$\frac{s\,dx + t\,dy}{(1+q^2)\,dy + pq\,dx} = \frac{r\,dx + s\,dy}{(1+p^2)\,dx + pq\,dy}$$

[illegible]

$$\frac{s\,[illegible] + t\,[illegible]}{1+q^2\,[illegible] + [illegible]} = [illegible]$$

$\times 2$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$+ Ra$

$\frac{dx + [illegible]}{[illegible]} = ds =$

$\frac{ds - dR}{=} \frac{dx + R\,d[illegible]}{a} = \frac{dy + R\,db}{b} = \frac{dz + R\,d[illegible]}{c}$

$dx + R\,d[illegible] - a(ds - dR) \qquad a \qquad = 0$

$dy + R\,db - b(ds - dR) \qquad b \qquad = 0$

$dz + R\,d[illegible] - c(ds - dR) \qquad c \qquad = 0$

$0 \qquad = ds - dR$

$ds = dR$

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] II

[illegible]

I

Fläche der [illegible]

[illegible]

[illegible]

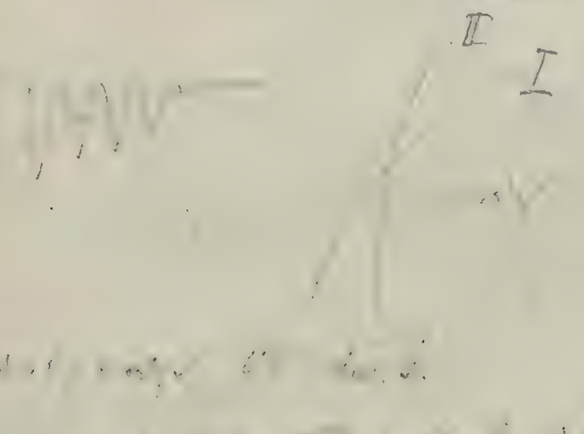
[illegible]

[illegible]

$$\begin{vmatrix} x & y & z \\ dx & dy & dz \\ \delta x & \delta y & \delta z \end{vmatrix} = 0$$ [illegible]

[illegible]

O.H.



[illegible]

[illegible] von
Tancred

[illegible]

Schnitt von 3 Flächen

$f(x\,y\,z) = \lambda$

$\varphi(x\,y\,z) = \mu$

$\psi(x\,y\,z) = \nu$

$x = \ldots$

y

z

... Tgnt proj. $\frac{\partial x}{\partial \lambda}$ $\frac{\partial y}{\partial \lambda}$ $\frac{\partial z}{\partial \lambda}$

$$\frac{\partial x}{\partial \lambda}\frac{\partial x}{\partial \nu}+\frac{\partial y}{\partial \lambda}\frac{\partial y}{\partial \nu}+\frac{\partial z}{\partial \lambda}\frac{\partial z}{\partial \nu}=0$$

$$\frac{\partial x}{\partial \lambda}\frac{\partial x}{\partial \mu}+$$

$$\frac{\partial x}{\partial \mu}\frac{\partial x}{\partial \nu}+$$

$$\frac{\partial x}{\partial \lambda}=\rho\left(\frac{\partial y}{\partial \nu}\frac{\partial z}{\partial \mu}-\frac{\partial z}{\partial \nu}\frac{\partial y}{\partial \mu}\right)$$

$$\frac{\partial y}{\partial \lambda}=\rho\left(\frac{\partial z}{\partial \nu}\frac{\partial x}{\partial \mu}-\frac{\partial x}{\partial \nu}\frac{\partial z}{\partial \mu}\right)$$

$$\frac{\partial z}{\partial \lambda}=\rho\left(\frac{\partial x}{\partial \nu}\frac{\partial y}{\partial \mu}-\frac{\partial y}{\partial \nu}\frac{\partial x}{\partial \mu}\right)$$

$$\frac{\partial I}{\partial \mu}\quad\frac{\partial II}{\partial \nu}\quad\frac{\partial III}{\partial \lambda}:$$

$$\sum\frac{\partial^2 x}{\partial \lambda\,\partial \mu}\frac{\partial x}{\partial \nu}+\frac{\partial^2 x}{\partial \lambda\,\partial \nu}\frac{\partial x}{\partial \mu}=1$$

$$\sum\frac{\partial^2 x}{\partial \lambda\,\partial \nu}\frac{\partial x}{\partial \mu}+\frac{\partial^2 x}{\partial \nu\,\partial \mu}\frac{\partial x}{\partial \lambda}=$$

$$\sum\frac{\partial^2 x}{\partial \lambda\,\partial \mu}\frac{\partial x}{\partial \nu}+\frac{\partial^2 x}{\partial \nu\,\partial \lambda}\frac{\partial x}{\partial \mu}=$$

$$1+2-3=0$$

5

$= 0$

$= 0$

= 9 e d.

Sr pim :

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

$$\frac{x}{a^2-\lambda} \qquad \frac{y}{b^2-\lambda} \qquad \frac{z}{c^2-\lambda}$$

$$\frac{x}{a^2-\mu} \qquad \frac{y}{b^2-\mu} \qquad \frac{z}{c^2-\mu}$$

λ_1 Ellipsoid

λ_2 einschaliges Hyperboloid

λ_3 zweischaliges Hyperboloid

$$\frac{x^2}{a^2-c^2} + \frac{y^2}{b^2-c^2} = 1$$

Focal-Ellipse

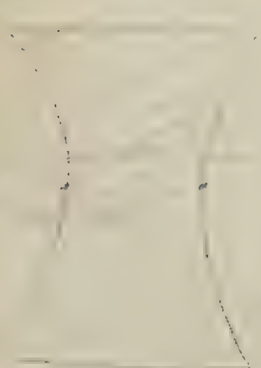
$\lambda_2 = c^2$

[illegible]

[illegible]

[illegible]

[illegible]



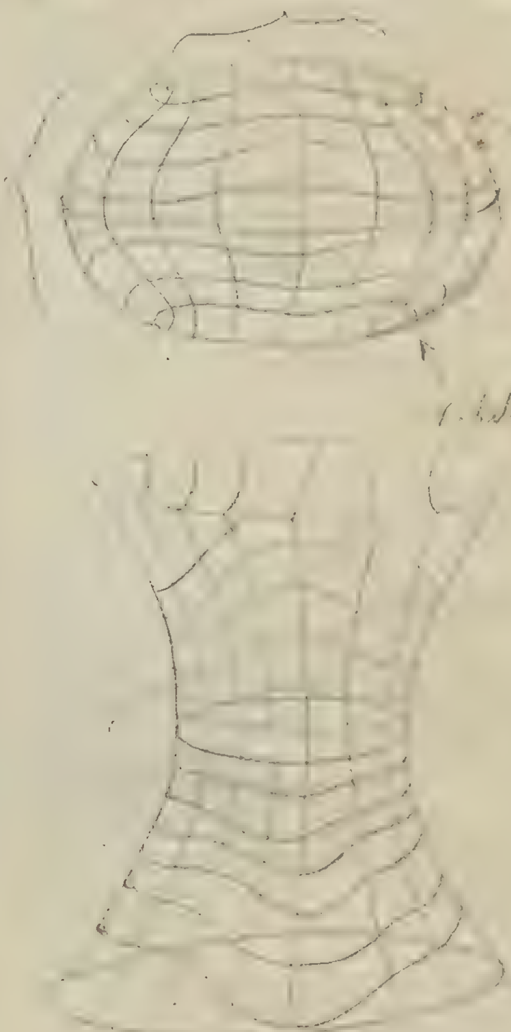
[illegible]

[illegible]

[illegible]

[illegible] YZ [illegible]

[illegible]



$\therefore \frac{\partial}{\partial t}$ [illegible]

[illegible] $\frac{1}{2} m \dot{x}^2$ [illegible] $U = mg$ [illegible]

i.e. $T - U$ i.e. kinet. Potential

$\therefore \frac{\partial}{\partial t}$ [illegible] $\frac{\partial}{\partial t}$ [illegible]

[illegible]

$$= d\left[\sum p_i \frac{\partial H}{\partial p_i} - H\right] = \sum F_i \, dp_i$$

$= \mathcal{E}$ [illegible]

$T =$ [illegible] $\therefore \sum p \frac{\partial T}{\partial p} = 2T$

[illegible]

$$\mathcal{E} = 2T - H = 2T - T + U = T + U$$

$= \sum e$ act. ς pot. [illegible]

[illegible] E [illegible]

[illegible]

A. [illegible]

$\sum (T - \dots \leq \dots \sum_{p} \dots)$ [illegible]

[illegible]

[illegible]

$\therefore dt' = -dt$ [illegible]

[illegible]

$\frac{d}{dt} \frac{d}{dp} = \frac{d}{dp}$ [illegible]

[illegible]

[illegible]

[illegible] reversible [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] $\frac{d}{dt}$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible] $= \frac{\partial^2}{\partial p} + P$ [illegible]

[illegible]

[illegible]

Ableitung der [illegible] Kraftfeld [illegible]

[illegible]

[illegible] $\int (\delta H + \Sigma P \, \delta p) \, dt = 0$

[illegible]

$H = T - U \qquad T = \Sigma$ [illegible]

$x \quad u$ [illegible] $\dot{u}$ [illegible]
$y \quad v \qquad \dot{v}$
$z \quad w \qquad \dot{w}$

$T = \int \frac{k}{2} (\dot{u}^2 + \dot{v}^2 + \dot{w}^2) \, d\tau$

$U =$ pot. En., [illegible]

[illegible]

$x_x \quad y_y \quad z_z$

$\frac{\partial u}{\partial x} \quad \frac{\partial v}{\partial y} \quad \frac{\partial w}{\partial z}$

$\frac{\partial u}{\partial y} - \frac{\partial v}{\partial x} \quad \frac{\partial v}{\partial z} - \frac{\partial w}{\partial y}$

$\frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} = x_y = y_x$

$\frac{\partial v}{\partial z} + \frac{\partial w}{\partial y} = y_z = z_y$

$\frac{\partial w}{\partial x} + \frac{\partial u}{\partial z} = z_x = x_z$

[illegible] $F\,di$ [illegible]

F [illegible] > 0 [illegible]

[illegible] $= 0$

[illegible]

X_ν

Y_ν

Z_ν

$\Sigma P \delta p = \int X_\nu \delta x + Y_\nu \delta y + Z_\nu \delta z$

$$- \int d\sigma \{ X_\nu \delta u + Y_\nu \delta v + Z_\nu \delta w \} = 0$$

$\ddot{u}\,\delta u$ part. int.

$$\int_{t_0}^{t_1} dt \Big\{ \int d\tau\, k (\ddot{u}\, \delta u + \ddot{v}\, \delta v + \ddot{w}\, \delta w) - \int d\tau \Big[\frac{\partial f}{\partial x_x} \delta x_x + \frac{\partial f}{\partial y_y} \delta y_y + \frac{\partial f}{\partial z_z} \delta z_z + \frac{\partial f}{\partial x_y} \delta x_y + \cdots + \int d\sigma \Big] = 0$$

$$x_x = \frac{\partial u}{\partial x} \qquad - \frac{\partial f}{\partial x_x} = X_x \quad \text{etc.}$$

$$\int d\tau \Big[X_x\, \delta \frac{\partial u}{\partial x} + \qquad \Big] = -\int \Big[\frac{\partial X_x}{\partial x} \delta u + \frac{\partial X_y}{\partial y} \delta u + \frac{\partial X_y}{\partial x} \delta v + \cdots + (\quad \Big] d\tau$$

$$- \int d\sigma \Big[X_x \cos \nu_x\, \delta u + Y_y \cos \nu_y\, \delta v + Z_z \cos \nu_z\, \delta w + X_y \cos \nu_y\, \delta u + X_y \cos \nu_x\, \delta v + \cdots + (\quad \Big]$$

$$k\ddot{u} + \frac{\partial X_x}{\partial x} + \frac{\partial Y_y}{\partial y} + \frac{\partial Z}{\partial z} = 0$$

$$k\ddot{v} + \frac{\partial X_x}{\partial x} + \frac{\partial Y_y}{\partial y} + \frac{\partial Y}{\partial z} = 0$$

$$k\ddot{w} + \qquad = 0$$

$$X_\nu = X_x \cos\nu_x + X_y \cos\nu_y + X_z \cos\nu_z$$

$$Y_\nu = Y_x \cos\nu_x + Y_y \cos\nu_y + Y_z \cos\nu_z$$

$$Z_\nu =$$

f X_x etc. [illegible]

[illegible]

$\boxed{\text{Sem}}$

[illegible] $= 0$ [illegible]

t_0 $x_0 y_0$

t_1 $x_1 y_1$

$H = \frac{m}{2}(\dot{x}^2 + \dot{y}^2) - m g y$

$\int H dt$ [illegible]

$t_0 = 0$ $t = 1$ $x_0 = y_0 = 0$

$x_1 = 1$ $y_1 = 0$

[illegible]

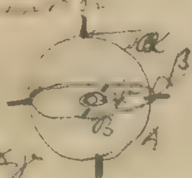
Bewegung eines Rotationskörpers

[illegible]

[illegible] x 𝔄

[illegible] x

[illegible]



[illegible]

$T = \frac{1}{2}\left(P p^2 + Q q^2 + R r^2\right)$ [illegible]

$p = \sin\vartheta \sin\varphi\,\dot\psi + \cos\varphi\,\dot\vartheta$ [illegible]

$q = \sin\vartheta \cos\varphi\,\dot\psi - \sin\varphi\,\dot\vartheta$

$r = \cos\vartheta\,\dot\psi + \dot\varphi$

$H = \frac{1}{2} Q\left(\sin^2\vartheta\,\dot\psi^2 + \dot\vartheta^2\right) + R\left(\cos^2\vartheta\,\dot\psi^2 + \dot\varphi^2 + 2\cos\vartheta\,\dot\psi\dot\varphi\right)$

[illegible]

$$\begin{cases} \frac{d}{dt}\left[\,[illegible]\,\right] = A \\ \frac{d}{dt}\left[\,[illegible]\,\right] - \{[illegible]\} = B \\ \frac{d}{dt}\left[\,[illegible]\,\right] = \Gamma \end{cases}$$

[illegible]

[illegible]

[illegible]

$\Gamma = 0$

[illegible] $= \text{const} = c$

[illegible]

$$\begin{cases} \frac{d}{dt}\left[\,[illegible] + c\,[illegible]\,\right] = A \\ \frac{d}{dt}\left[\,[illegible]\,\right] - \left[\,[illegible] - c\,[illegible]\,\right] = B \end{cases}$$

[illegible]

[illegible]

[illegible] $= 0$ $c = $ [illegible]

$$\begin{cases} A = \frac{d}{dt}\,[illegible] \\ B = \frac{d}{dt}\left[\,[illegible]\,\right] - [illegible]\left[\,[illegible] + [illegible]\,\right] i^2 \end{cases}$$

[illegible]

Allgem. [illegible] Cond. [illegible]

[illegible] $p_1 \; p_2 \; p_3$ [illegible]

$p_1' \; p_2' \; p_3'$ [illegible]

P_1' etc. $= 0$ [illegible]

[illegible] p' $\quad H = f(p, p, p')$

$\frac{\partial T}{\partial p_1'} = 0 \quad < \quad \frac{\partial L}{\partial p_1}$ [illegible] ≤ 0

$$P = \frac{\partial}{\partial t}\left(\frac{\partial H}{\partial p}\right) - \frac{\partial L}{\partial p} \qquad \Bigg| \qquad P' = \frac{\partial}{\partial t}\left(\frac{\partial H}{\partial p'}\right) - \frac{\partial L}{\partial p}$$

$\therefore$

$$\underbrace{\begin{aligned} \frac{\partial H}{\partial p_1'} &= c_1 \\ \frac{\partial H}{\partial p_2'} &= c_2 \quad \text{etc.} \end{aligned}}_{\text{elim. homog fn. [illegible]}}$$

$p_1' \; p_2'$ etc. [illegible]

[illegible] Cond. [illegible] H [illegible]

$$\frac{\partial \mathcal{L}}{\partial p} = \frac{\partial H}{\partial p} + \sum \frac{\partial H}{\partial p_1'} \frac{\partial p_1'}{\partial p}$$

$= c_1$ etc.

$$= \frac{\partial}{\partial p}\left[H + \Sigma c_1 p_1'\right]$$

$$\frac{\partial \mathcal{L}}{\partial p'} = \frac{\partial H}{\partial p'} + \sum \frac{\partial H}{\partial p_1'} \frac{\partial p_1'}{\partial p'}$$

$$= \frac{\partial}{\partial p'}\left[H + \Sigma c_1 p_1'\right]$$

$$H - \Sigma c_1 p_1' = K = f(p, p')$$

$$\left(\frac{\partial H}{\partial p_1'}\right) = \left(\frac{\partial K}{\partial p}\right)_{p'}$$

$$P = \frac{d}{dt}\left(\frac{\partial K}{\partial p'}\right) - \frac{\partial K}{\partial p}$$

[illegible]

K [illegible] linear [illegible]

[illegible]

15

$\int \delta i - \Sigma P \delta p \, dt = 0$

$L M N$

$L = \dot{u} \quad M = \dot{v} \quad N = \dot{w}$

$X = \frac{c}{K} \left(\frac{\partial w}{\partial y} - \frac{\partial v}{\partial z} \right)$

$Y = \frac{c}{K} \left(\frac{\partial u}{\partial z} - \frac{\partial w}{\partial x} \right)$

$Z =$

$u \; v \; w$

$\delta H = \delta T - \delta U \qquad \Sigma P \delta p = \Sigma U \delta u + \Sigma V \delta v +$

$U = U_0$

$$\int_{t_0}^{t_1} \delta T \, dt = \int_{t_0}^{t_1} \frac{\mu}{4\pi} \left[L \delta L + M \delta M + N \delta N \right] =$$

$$= \int_{t_0}^{t_1} \frac{\mu}{4\pi} \left[\dot{u} \, \delta \dot{u} + \right.$$

$$= - \int_{t_0}^{t_1} \frac{\mu}{4\pi} \left[\frac{\partial L}{\partial t} \delta u + \frac{\partial M}{\partial t} \delta v + \frac{\partial N}{\partial t} \delta w \right]$$

$$+ \int_{t_0}^{t_1} \left[L \delta u + M \delta v + \quad \right]$$

$\delta u =$

$$\int \ldots dt = - \int \frac{\ldots}{\ldots} \ldots$$

$$= - \frac{c}{4\pi} \int \left[X \delta \ldots \right] dt$$

$$= \frac{c}{4\pi} \int \left[\left(\ldots - \frac{\partial Y}{\partial x} \right) \delta \ldots + \right] dt$$

$$- \frac{c}{4\pi} \int \left[\ldots \delta w \cos \nu y - \delta v \cos \nu z \ldots \right] dt$$

$$\therefore \quad \mu \frac{\partial L}{\partial t} = c \left(\frac{\partial Y}{\partial z} - \frac{\partial Z}{\partial y} \right)$$

$$\mu \frac{\partial M}{\partial t} = c \left(\frac{\partial Z}{\partial x} - \frac{\partial \ldots}{\partial \ldots} \right)$$

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$$U_r = - \frac{c}{4\pi} \left[Y \cos \nu z - Z \cos \nu y \right]$$

$$V_r =$$

$$W_r =$$

Energie [illegible] $d\tau\, dt$ 97

$= L \, [illegible]$

$= $ Energieflux [illegible]

[illegible] spec. [illegible] $\frac{\partial u}{\partial y} - \frac{\partial v}{\partial x}$ etc. [illegible]

17/5 Spezielles Beispiel: Endliche Anzahl von linearen Leitern, welche [illegible] (ℓ [illegible] etc.)

p Var. [illegible] $i_1\ i_2\ i_3$

[illegible] $\varepsilon_1\ \varepsilon_2\ \varepsilon_3$ [illegible]

$$H = T - U \qquad \underbrace{}_{=E}$$

$$\tfrac{1}{2}\left[L_1 i_1^2 + L_2 i_2^2 + \cdots\right] + L_{12}\, i_1 i_2 + \cdots \qquad + T$$

$$L_1 = \frac{1}{c^2}\iint \frac{ds\, ds'}{r} \cos\Theta$$

[illegible] Energie

[illegible] P_1 P_2 [illegible] E_1 E_2 [illegible]

$$P = \frac{\partial}{\partial t}\left(\frac{\partial T}{\partial p'}\right) - \frac{\partial T}{\partial p}$$

$$= \frac{\partial}{\partial t}\frac{\partial T}{\partial p'} - \frac{\partial T}{\partial p} - \frac{1}{2}\left[L_1\, i_1^2 \frac{\partial L_1}{\partial p} + \cdots\right]$$

[illegible]

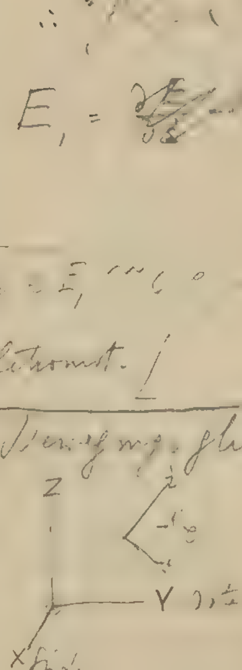
$$E_1 = \frac{\partial T}{\partial i_1} \cdots \frac{\partial}{\partial t}\left[L_1 i_1 + L_{12}\, i_2 + \cdots\right]$$

= [illegible]

[illegible] E_1 [illegible]

electromot. [illegible]

[illegible] [illegible]



[illegible] Z [illegible]

$$\frac{1}{2}\,\mathcal{C}\,\omega^2 + \frac{m}{2}\left[x'^2 + y'^2 + z'^2\right]$$

$$x' = \dot{x} - y \sin\varphi\ \omega$$

$$y' = \dot{y}\,[R + x\sin\varphi + z\cos\varphi]\,\omega$$

$$z' = \dot{z} - y\cos\varphi\ \omega$$

$$= \frac{1}{2}m \ \cdots$$

$\Omega = \frac{1}{2}$ [illegible]

$\Omega = x'Y' - y'X' = xY - yX \cos\varphi + [(x+z)Y - yZ]\cos$

$X = m[\ddot{x} - \ldots] = m\ddot{x} - 2\dot{y}\sin\varphi\,\omega - \rho\omega^2\sin\varphi$

$Y = m\ddot{y} - \ldots = m\ddot{y} - 2\dot{x}\ldots + 2\dot{z}\cos\varphi\,\omega - y\omega^2$

$= m\ddot{z} - 2\dot{y}\cos\varphi\,\omega - \rho\omega^2\cos\varphi$

$\frac{\partial\Omega}{\partial t} = 0 \qquad \Omega = \text{const}$

$Z = g$

$\ddot{x} - R\omega^2\ldots = 0$

$\ddot{y} - y\omega^2 = \ldots$

$\ddot{z} - R\omega^2\cos\ldots = g$

$g = \ddot{x} - 2\dot{y}\sin\varphi\,\omega$

$0 = \ddot{y}$

$-g = \ddot{z} -$

$\dot{y}\ \ \dot{x}\ \ \dot{z}$ [illegible] $\quad \therefore\ x = 0$

$z = h - g\frac{t^2}{2}$

$y = \frac{1}{3}\omega\cos\varphi\, g t^3$

$$dE = d\varphi - T\,d\tau$$

$$\frac{d\varphi}{\vartheta} - d\,[illegible]$$

[illegible]

$$\frac{Jt}{\varepsilon} = N + N'$$ [illegible] Concentration [illegible]

[illegible] Ag [illegible] NO_3 [illegible]

[illegible]

[illegible] $\frac{N'}{N+N'}$ [illegible] $= n'$

[illegible] Jonen [illegible]

[illegible] gr. mol. NO_3 [illegible] $1\,cm^3$ [illegible] $\varphi = 3$ [illegible]

$$U \cdot t\, \varphi = \frac{Jt}{\varepsilon}\, n \qquad V \cdot t\, \varphi = \frac{Jt}{\varepsilon}\, n'$$

$$U = \frac{Jn}{\varepsilon\, \varphi\, C} \qquad V = \frac{Jn'}{\varepsilon\, \varphi\, C}$$

$\varepsilon =$ [illegible] $=$ [illegible] gr. ~~mol~~ Jon.

[illegible]

$1g.$ [illegible] $= 9.81$ [illegible]

760 [illegible] $g = $ [illegible]

$c = \frac{1}{330}$ [illegible]

$g = 0.00$ [illegible] $V = $ [illegible]

[illegible]

$h = k \frac{D}{r_2}$ $V = $ [illegible]

$\frac{k}{C}$ = [illegible]

[illegible] C $\frac{1}{\Delta}n$ [illegible]

[illegible]

[illegible] Kohlrausch [illegible]

$\lambda = u_1 + v_0$ $u = \frac{U}{P}$ [illegible]

[illegible] $\times 5$

	K	Na	[illegible]	Ag	NH₄	H		ca 18°C
$u_a \cdot 10^7$	[illegible]	[illegible]	[illegible]	52	[illegible]	303		80
$v_a \cdot 10^7$	[illegible]	[illegible]	56	52	54	165	44	33
	Cl	I	NO_3	[illegible]	ClO_3	HO	CHO_2	$C_2H_3O_2$

[illegible] $= \frac{x}{m}$ [illegible] 12.8

$m = 1000 . c$

[illegible]

[illegible] $\frac{52}{52+58} = 0.473$ [illegible]

[illegible] 1180 [illegible] $18 \mathrm{h} = 1080$ [illegible]

$P = 10^{+8}$ $\quad \varepsilon = 9653$ $\quad$ [illegible] $= 1000 . u_a \lambda$ [illegible]

$$U = \frac{10^{8} . 10^{3} . [illegible] . 52 .}{9653 .} \cdot \frac{1863}{10^{9}} . 10^{7}$$

$= 52 . 10^{-7} . 10 \cdot 2$

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$\sum = [illegible]$

$= \frac{[illegible]}{[illegible]}$

$\sum = [illegible] \frac{[illegible]}{[illegible]} = [illegible]$

$\lim \frac{[illegible]}{[illegible]} = [illegible] = \frac{1}{k+1}$

$\sum = [illegible] \frac{1}{k+1}$

[illegible]

$\sum [illegible]$

$= \sum [illegible]$

$\int [illegible]$

$a = 0$

$a > 0$

$$\int e^{-ax}\,dx = \frac{e^{-ax}}{-a}$$

$$\int e^{-(a+bi)x}\,dx = \frac{e^{-(a+bi)x}}{-(a+bi)}$$

$$\int_0^\infty \cdots = \frac{1}{a+bi} \qquad a > 0$$

$$e^{-(a+bi)x} = e^{-ax}(\cos bx - i \sin bx)$$

$$\int_0^\infty e^{-ax}\cos bx\,dx = \frac{a}{a^2+b^2} \qquad a > 0$$

$$\int_0^\infty e^{-ax}\sin bx\,dx = \frac{b}{a^2+b^2} \qquad a > 0$$

$$\frac{1}{a} = \int_0^\infty e^{-ax}\,dx$$

$0 \qquad \mu > 0$

$y = \frac{b}{k} x$

[illegible]

$k = 0 \;\Big|\;$ [illegible] $\displaystyle\int$ [illegible]

$c =$ [illegible]

$\displaystyle\int$ [illegible] $= \begin{cases} \frac{\pi}{2} \ldots & \text{[illegible]} \\ -\frac{\pi}{2} \ldots & \text{[illegible]} \end{cases}$

[illegible]

$= \begin{cases} \text{[illegible]} \\ -\frac{\pi}{2} \ldots & \text{[illegible]} \end{cases}$

[illegible]

$\displaystyle\int$ [illegible]

[illegible]

π [illegible]

[illegible]

$$\int_1^x \frac{dx}{x} = \log x$$

[illegible]

[illegible]

$0 \leq$ [illegible]

[illegible]

[illegible]

[illegible]

$S = \cos\theta + \cos 2\theta + \ldots + \cos n\theta$ [illegible]

$2\cos\theta = 1 + \cos\theta +$ [illegible]

[illegible]

$$S = -\frac{1}{2} + \frac{\sin(2n+1)\frac{\theta}{2}}{2\sin\frac{\theta}{2}}$$

I.

$+\pi > x > -\pi$

II. $f x = 1$

$\frac{\pi}{4}$ $\qquad x > 0$

$0 \qquad x = 0$

$-\frac{\pi}{4} \qquad x < 0$

III

[illegible]

$\frac{\pi}{2} = $ [illegible]

$\frac{\pi}{4} = 1 - $ [illegible]

sin-Reihen

$f(x)$, [illegible]

$2 f(x) \dots = a_1 \sin x + a_2 \sin 2x - a_3 \sin 3x + \dots$

$a_m = \frac{2}{\pi}\int_0^{\pi}$ [illegible]

$b_k = \frac{4}{\pi}\int_0$ [illegible]

$a_m = b_m - b_{m+1}$

$2 f(x) \dots = (b_0 - b_1)\sin x + $ [illegible]

[illegible]

[illegible]

$f(x) = \frac{f(x+0) + f(x-0)}{2}$ [illegible]

$$b_m = \frac{2}{\pi}\int_0^{\pi} [illegible]\, dx$$

$$a_m = \frac{2}{\pi}\int_0^{\pi} [illegible]\, dx$$

$f(x) = \frac{b_0}{2} +$ [illegible]

$$b_m = \frac{1}{\pi}\int_{-\pi}^{\pi} f(x) \cos mx\, dx \qquad \pi > x > -\pi$$

$$a_m = \frac{1}{\pi}\int_{-\pi}^{\pi} f(x) \sin mx\, dx$$

$$\int_{\frac{(\nu-1)\pi}{h}}^{\frac{\nu\pi}{h}} [illegible] > [illegible] > [illegible]$$

$$\frac{2}{h \sin \frac{(\nu-1)\pi}{h}} > \rho [illegible] > \rho_\nu [illegible]$$

[illegible]

$T > \ldots$ [illegible]

$> \ldots$ [illegible]

$T < \ldots$ [illegible]

$T \ldots$ [illegible]

$T < \ldots$ [illegible]

$n = \infty$
$l = \infty$ [illegible]
$m = \infty$

$\lim T = \ldots$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$$= \frac{1}{[illegible]} \int_{[illegible]}^{\frac{n-1}{2}} [illegible] = \frac{1}{[illegible]} [illegible]$$

[illegible]

[illegible]

$\varphi(x) =$ [illegible]

[illegible] $n > x > -n$

$\varphi(x) =$ [illegible]

[illegible] $c > x > -c$

[illegible]

$\varphi(x) =$ [illegible]

m^2 [illegible]

[illegible]

2). $y = \ldots$

$X = \ldots \frac{d^n y}{dx^n} \ldots$

$+ \ldots$

$+ \ldots$

$$u = \sum_{n=1}^{\infty} \text{[illegible]}$$

$$= \int_0^t \varphi(\lambda) \, \text{[illegible]} \, d\lambda$$

$$u = \frac{x}{2a\sqrt{\pi}} \int_0^t \varphi(\lambda) \, e^{-\frac{x^2}{4a^2(t-\lambda)}} (t-\lambda)^{-\frac{3}{2}} \, d\lambda$$

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] [illegible]

$$X = [illegible] \sum m \frac{[illegible]}{[illegible]}$$

$$Y = [illegible] \sum \frac{[illegible]}{r_i}$$

[illegible]

[illegible] $\frac{\partial}{\partial}$ [illegible]

$$X = [illegible] - \frac{\partial V}{\partial x} \qquad V = [illegible] \frac{m}{r} [illegible]$$

[illegible]

$$X = \iiint \frac{[illegible] - x}{r^3} \rho \, [illegible]$$

[illegible]

$$V = \iiint \rho \frac{[illegible]}{r}$$

[illegible]

[illegible]

[illegible]

$V = F(r)$ [illegible]

[illegible]

$$\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} + \frac{\partial^2 V}{\partial z^2} = \frac{d^2 V}{dr^2} + \frac{2}{r}\frac{dV}{dr} = 0$$

[illegible]

$V = \frac{a}{r} + b$ [illegible]

I. [illegible]

[illegible] $V_0 = 4\pi$ [illegible]

$= 0$ [illegible]

$V = 2\pi\rho\,[\,a^2 - \ldots\,]$ [illegible]

II. $r > a$ [illegible]

[illegible] $r = \infty$: $V = 0$

$\therefore b = 0$

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$x =$ [illegible]

$y =$ [illegible]

$c =$ [illegible]

$\zeta =$ [illegible]

[illegible]

$X =$ [illegible]

$Y =$ [illegible]

$Z =$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

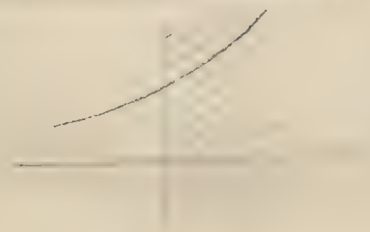
[illegible] $<$ [illegible]

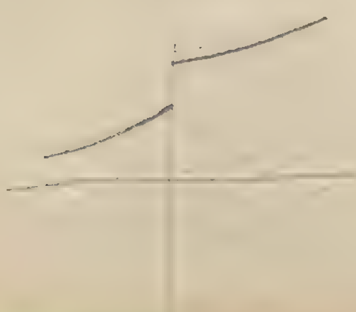
$<$ [illegible] $= <$ [illegible] $= 0$

[illegible] $= 0$ [illegible]

[illegible] $\frac{d\alpha}{}$ [illegible]

[illegible]





[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$\int$ [illegible]

$=$ [illegible]

$= 0$ [illegible]

$=$ [illegible]

[illegible] $=$ [illegible]

$N = \int$ [illegible]

$\int i\,d\sigma = $ [illegible] $=$

$\omega T = $ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] H [illegible]

[illegible] C [illegible] H

[illegible] H : C [illegible] H

[illegible] C [illegible]

[illegible] N : C = $\frac{1}{?}$ [illegible]

Physik 91/92

[illegible]

[illegible]

$$D = f(r) \qquad D' = f(r + \Delta r)$$

$$D : D' = P : P'$$

$$P = \frac{(r+\Delta r)^2 4\pi \, . \, P' + \frac{M \cdot m}{r^2} k}{4 r^2 \pi}$$

$$m = 4 r^2 \pi \, dr \, . \, \frac{D'}{g}$$

$$P = \frac{(r+\Delta r)^2 P' + 4 r^2 \Delta r \frac{D' k}{g}}{r^2} \quad \Big| \quad P' = P - M \Delta r \frac{D k}{g}$$

$$\frac{D' - D}{\Delta r} : D = \frac{P' - P}{\Delta r} : P$$

$$: D_0 = P : P_0$$

$$\frac{D' - D}{\Delta r} = \frac{P' - P}{\Delta r} \frac{D}{P}$$

$$\frac{D}{P} = \frac{D_0}{P_0}$$

$$\frac{dD}{dr} = \frac{dP}{dr} \frac{D_0}{P_0}$$

$$\frac{P' - P}{\Delta r} = \frac{P - M \Delta r \frac{D' k}{g} - P}{\Delta r} = - \frac{M D' k}{g}$$

$$\frac{dD}{dr} = - \frac{D_0}{P_0} \frac{M D k}{g}$$

$$\frac{D_0}{P_0} \frac{M k}{g} = a$$

$$\frac{dD}{D} = -a\,dr$$

$$lD = -ar + b$$

$$lD_0 = -a r_0 + b$$

$$l\frac{D}{D_0} = -a(r - r_0)$$

$$D = D_0\, e^{-a(r-r_0)} = D_0 \frac{e^{-ar}}{e^{-a r_0}} = c\, e^{-ar}$$

$$c = \frac{D_0}{e^{-a r_0}} = D_0\, e^{a r_0}$$

[illegible] $M = D$: [illegible]

$D = D_0$

$$P = \frac{P_0}{D_0} D = P_0 \frac{e^{-ar}}{e^{-a r_0}}$$

$$G = \int_\rho^R 4 r^2 \pi D\, dr$$

$$= 4 c \pi \int_\rho^R e^{-ar} r^2\, dr$$

$$\int e^{-ax} x^2\, dx = -\frac{e^{-ax} x^2}{a} + \frac{2}{a}\int e^{-ax} x\, dx$$

$$= -\frac{e^{-ax} x^2}{a} + \frac{2}{a}\left\{-\frac{e^{-ax} x}{a} + \frac{1}{a}\int e^{-ax}\, dx\right\}$$

$$= -\frac{e^{-ax} x^2}{a} + \frac{2}{a}\left\{-\frac{e^{-ax} x}{a} - \frac{1}{a^2} e^{-ax}\right\} = -e^{-ax}\left[\frac{x^2}{a} + \frac{2x}{a^2} + \frac{2}{a^3}\right]$$

$$V = -4c\pi\, e^{-ar}\left[\frac{r^2}{a} + \frac{2r}{a^2} + \frac{2}{a^3}\right]_R^{\rho}$$

$$= 4c\pi\, e^{-ar}\left[\frac{r^2}{a} + \frac{2r}{a^2} + \frac{2}{a^3}\right]_{\rho}^{R}$$

in eine Reihe entwickelt:

$$= 4c\pi\left[1 - ar + \frac{a^2r^2}{1.2} - \frac{a^3r^3}{1.2.3} + \frac{a^4r^4}{1.2.3.4} - \frac{a^5r^5}{5!} \cdots\right]\left[\frac{r^2}{a} + \frac{2r}{a^2} + \frac{2}{a^3}\right]$$

$$= 4c\pi\Big[\frac{r^2}{a} - r^3 + \frac{ar^4}{2} - \frac{a^2r^5}{3!} + \frac{a^3r^6}{4!} - \frac{a^4r^7}{5!} +$$

$$+ \frac{2r}{a^2} - \frac{2r^2}{a} + \frac{2r^3}{2} - \frac{2ar^4}{3!} + \frac{2a^2r^5}{4!} - \frac{2a^3r^6}{5!} +$$

$$+ \frac{2}{a^3} - \frac{2r}{a^2} + \frac{2r^2}{2a} - \frac{2r^3}{3!} + \frac{2ar^4}{4!} - \frac{2a^2r^5}{5!} + \Big]$$

$$= 4c\pi\left[\frac{2}{a^3} - \frac{2r^3}{3!} + ar^4\left(\frac{1}{2} - \frac{2}{3!} + \frac{2}{4!}\right) - a^2r^5\left(\frac{1}{3!} - \frac{2}{4!} + \frac{2}{5!}\right) \cdots\right]$$

[illegible] beim Substituieren der Grenzwerte [illegible] heraus, also auch:

$$V = 4c\pi\left[-\frac{r^3}{3} + \frac{ar^4}{4} - \frac{a^2r^5}{10} + \frac{a^3r^6}{36} \cdots\right]_R^{\rho}$$

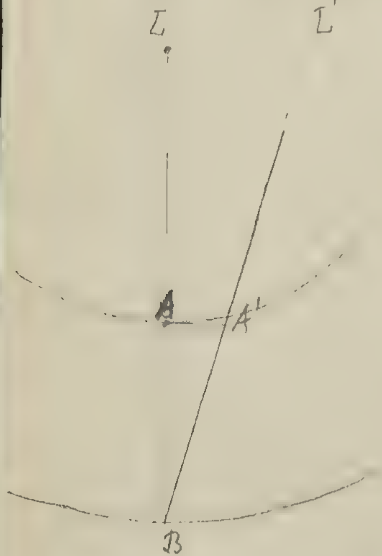
$$= 4c\pi\left[\frac{r^3}{3} - \frac{ar^4}{4} + \frac{a^2r^5}{10} - \frac{a^3r^6}{36} \cdots\right]_{\rho}^{R}$$

In der That gibt dies für $H = 0$, $a = 0$: $V = \frac{4c\pi}{3}\left[R^3 - \rho^3\right]$

~~[illegible]~~

Aberration [illegible]

[illegible]



[illegible] A [illegible]

[illegible]

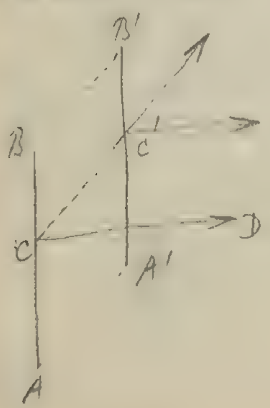
[illegible] B

[illegible]

[illegible] A'B [illegible]

[illegible]

[illegible] AB [illegible] A'B' [illegible]



[illegible] CC' [illegible]

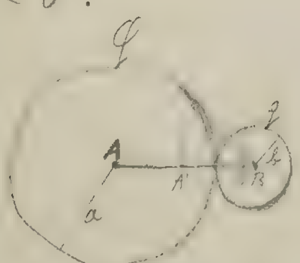
CD [illegible]

[illegible]

$$\frac{Q}{a} = \frac{q}{b} = \frac{Q+q}{a+b} \qquad Q+q = C$$

$$= \frac{C}{a+b}$$

$a < B$:



a inducirt

$Q + q =$

B ind. : $\frac{Q\,b}{a+b} + \frac{q\,a\,b}{(a+b)(a+b-\frac{a^2}{a+b})}$

A ind. $\frac{q\,a}{a+b}$

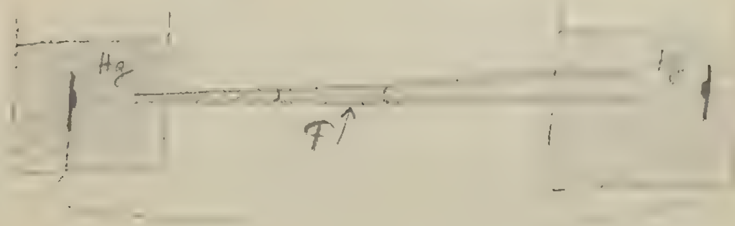
inducirt

$\frac{Q}{a} + \frac{q}{a+b} = \frac{q}{b} + \frac{Q}{a+b}$ | $Q\cancel{ab} + Q b^2 + q\cancel{ab} = q a^2 + q$

[illegible]

$c' = q + q + q\,\dfrac{b + 2a}{[illegible]} = q\,\dfrac{[illegible]}{[illegible]}$ [illegible]

Apparat zur Kalibrierung von Röhren auf elektrischem Wege (Widerstandsbestimmung)

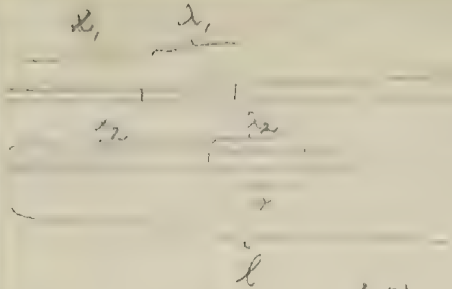


In die Röhre wird ein Stück einer schlecht leitenden Flüssigkeit eingezogen F; und [illegible] der Widerstand [illegible] angeschlossen [illegible]. Falls nun der Querschnitt ungleich ist, so [illegible] mit der Länge der schlecht leitenden Flüssigkeitssäule [illegible] aus [illegible] den Schwankungen des Widerstandes.

$$w = \alpha \frac{l}{q}$$

$$\Sigma w = W = \alpha \int \frac{dl}{q}$$

? ist dann das ohmische Gesetz noch gültig? wenn [illegible] Querschnitt verschieden [illegible]



$$V_1 = \alpha\int_0^{x_1}\frac{dx}{q} + \beta\int_{x_1}^{x_1+\lambda_1}\frac{dx}{q} + \alpha\int_{x_1+\lambda_1}^{l}\frac{dx}{q}.$$

$$V_2 = \alpha\int_0^{x_2}\frac{dx}{q} + \beta\int_{x_2}^{x_2+\lambda_2}\frac{dx}{q} + \alpha\int_{x_2+\lambda_2}^{l}\frac{dx}{q}.$$

$$x_2 = x_1 + \xi$$

$$V_1 - V_2 = -\alpha\int_{x_1}^{x_2}\frac{dx}{q} + \beta\left[\int_{x_1}^{x_2}\frac{dx}{q} - \int_{x_1+\lambda_1}^{x_2+\lambda_2}\frac{dx}{q}\right] + \alpha\int_{x_1+\lambda_1}^{x_2+\lambda_2}\frac{dx}{q}$$

$$= (\beta-\alpha)\left[\int_{x_1}^{x_2}\frac{dx}{q} - \int_{x_1+\lambda_1}^{x_2+\lambda_2}\frac{dx}{q}\right]$$

$$v = \text{const.} = \int_{x_1}^{x_1+\lambda_1} q\,dx = \int_{x_2}^{x_2+\lambda_2} q\,dx = \lambda_2\, q_m$$

$\cancel{W_1 = W_2 = f(x)}$

Wenn der Widerstand ~~[illegible]~~ gegen den ganzen Widerstand β zu vernachlässigen ist, so kann man setzen:

$$W_1 = \beta \int_{x_1}^{x_1+\lambda_1} \frac{dx}{q} = \frac{\beta \lambda_1}{(q_1)}$$

$(q) = [illegible]$

$$W_2 = \beta \int_{x_2}^{x_2+\lambda_2} \frac{dx}{q} = \frac{\beta \lambda_2}{(q_2)}$$

$$\frac{W_1}{W_2} = \frac{\lambda_1}{\lambda_2} \frac{(q_2)}{(q_1)} \qquad v = \lambda_1 (q_1) = \lambda_2 (q_2)$$

$$\frac{\lambda_1}{\lambda_2} = \frac{(q_2)}{(q_1)}$$

$$= \left(\frac{\lambda_1}{\lambda_2}\right)^2 = \left[\frac{(q_2)}{(q_1)}\right]^2$$

$$\frac{(q_2)}{(q_1)} = \sqrt{\frac{W_1}{W_2}}$$

Eine genauere Formel erhält man, wenn man auch den Widerstand W_0 = ohne den Tropfen

[illegible]

[illegible] :

$$W_1 = \frac{\beta l}{\rho_1} + W_0 \qquad \frac{\rho_2}{\rho_1} = \sqrt{\frac{W_1 - W_0}{W_2 - W_0}}$$

$$W_2 = \frac{\beta l}{\rho_2} + W_0$$

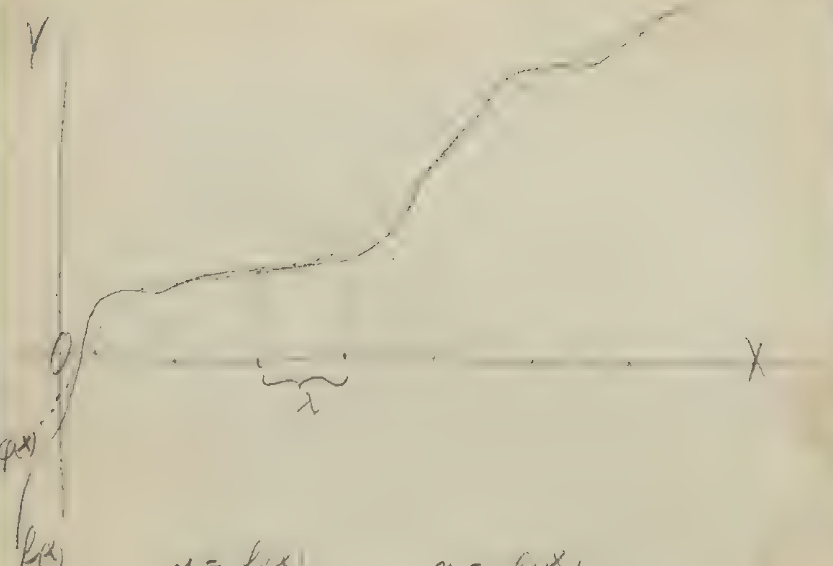
~~[illegible]~~ [illegible] ~~[illegible]~~

$$W_1 = \alpha\int_0^{l}\frac{dx}{\rho} - \alpha\int_{x_1}^{x_1+\lambda_1}\frac{dx}{\rho} + \beta\int_{x_1}^{x_1+\lambda_1}\frac{dx}{\rho}$$

$$= W_0 + (\beta-\alpha)\int_{x_1}^{x_1+\lambda_1}\frac{dx}{\rho} = W_0 + (\beta-\alpha)\frac{\lambda_1}{\rho_1}$$

$$W_2 = W_0 + (\beta-\alpha)\frac{\lambda_2}{\rho_2}$$

$$\frac{W_1 - W_0}{W_2 - W_0} = \frac{\lambda_1}{\lambda_2}\,\frac{\rho_2}{\rho_1} = \left[\frac{\rho_2}{\rho_1}\right]^2.$$



$y = f(x)$ $\qquad\eta = f(x)$

$$\eta = \frac{1}{\lambda}\int_{x-\frac{\lambda}{2}}^{x+\frac{\lambda}{2}} f(x)\,dx$$

Schreibt bei physikal. Appar. wird man für φx bestimmt, während $f(x)$ gesucht wird;

eine stellt den mittleren Verlauf in einem Intervalle dar. z.B. Spektrallinien

[1). Übereinanderlegen der Spaltbilder

2). bei Untersuchung mit Bolometer, Radiometer,

Calibrieren von Skalen, Temperatur-Messung mittelst Thermometer etc.]

Wie findet man $f(x)$?

$$\varphi(x) = \frac{1}{\lambda}\int_{x-\frac{\lambda}{2}}^{x+\frac{\lambda}{2}} f(x)\,dx = \frac{1}{\lambda}\int_{x-\lambda}^{x+\frac{\lambda}{2}} f(x)\,dx$$

$$\frac{d\varphi}{dx} = \frac{1}{\lambda}\left[f(x+\tfrac{\lambda}{2}) - f(x-\tfrac{\lambda}{2})\right]$$

$$= \frac{1}{\lambda}\left[f(x) + \frac{\lambda}{2} f'(x) + \frac{\lambda^2}{4}\frac{1}{2} f''(x) + \frac{\lambda^3}{8}\frac{1}{2\cdot 3} f'''(x) + \dots \right.$$
$$\left. - f(x) + \dots - \dots + \dots \right]$$

$$= f'(x) + \frac{\lambda^2}{4}\frac{1}{2\cdot 3} f'''(x) + \frac{\lambda^4}{16}\frac{1}{5!} f^{V}(x) + \dots$$

$$\cancel{\lambda\frac{d\varphi}{dx} = \lambda f'(x) + \frac{\lambda^3}{4}\frac{1}{2\cdot 3}}$$

$$\varphi(x) = \int \frac{d\varphi}{dx}\,dx = f(x) + \frac{\lambda^2}{4}\frac{1}{2\cdot 3} f''(x) + \frac{\lambda^4}{16}\frac{1}{5!} f^{IV}(x) + \dots$$

I Näherungs-Methode.

$$f_1(x) = \varphi(x) - \frac{\lambda^2}{4}\frac{1}{2\cdot 3}\varphi''(x) - \frac{\lambda^4}{16}\frac{1}{5!}\varphi^{IV}(x) - \frac{\lambda^6}{64}\frac{1}{7!}\varphi^{VI}$$

$$f_2(x) = \varphi(x) - \frac{\lambda^2}{4}\frac{1}{2\cdot 3} f_1''(x) - \frac{\lambda^4}{16}\frac{1}{5!} f_1^{IV}(x)$$

etc.

$$f_3(x) = \varphi(x) - \frac{\lambda^2}{4}\frac{1}{2\cdot 3} f_2''(x) - \dots$$

oder:

$$f_2(x) = \varphi(x) - \frac{\lambda^2}{4}\frac{1}{2\cdot 3}\left[\varphi''(x) - \frac{\lambda^2}{4}\frac{1}{2\cdot 3}\varphi^{IV}(x) - \frac{\lambda^4}{16}\frac{1}{5!}\varphi^{VI}(x) \dots\right]$$

$$-\frac{\lambda^4}{16}\cdot\frac{1}{5!}\left[\varphi^{IV}x - \frac{\lambda^2}{4}\cdot\frac{1}{2.3}\varphi^{VI}x - \frac{\lambda^2}{16}\frac{1}{5!}\varphi^{VIII}\right.$$

$$-\frac{\lambda^6}{64}\cdot\frac{1}{7!}\left[\varphi^{VI}x - \frac{\lambda^2}{4}\cdot\frac{1}{2.3}\varphi^{VIII}x - \right.$$

$- \; - \quad — \quad —$

$$= \varphi x - \frac{\lambda^2}{4}\cdot\frac{1}{2.3}\varphi'' x + \left[\frac{\lambda^4}{16}\left(\frac{1}{2.3}\right)^2 - \frac{\lambda^4}{16}\cdot\frac{1}{5!}\right]\varphi^{IV}$$

$$+\frac{\lambda^6}{64}\left[\frac{1}{2.3}\cdot\frac{1}{5!}+\frac{1}{5!}\frac{1}{2.3}-\frac{1}{7!}\right]\varphi^{VI}x$$

etc.

bei Einschränkung auf 4te Potenz

[Coeff. v. 6ten $= \frac{1}{322560}$!]

$$f_2(x) = \varphi(x) - \frac{\lambda^2}{24}\varphi''(x) + \frac{7\lambda^4}{5760}\varphi^{IV}(x) <$$

$$f_3(x) = \varphi x - \frac{\lambda^2}{4}\cdot\frac{1}{2.3}\left[\varphi''(x) - \frac{\lambda^2}{24}\varphi^{IV}x + \frac{7}{5\ldots}\right.$$

$$\ldots + \frac{\lambda^4}{16}\cdot\frac{1}{5!}\varphi^{IV}x$$

$$= \varphi x - \frac{\lambda^2}{24}\varphi'' x + \frac{7\lambda^4}{5760}\varphi^{IV}x = \ldots$$

$$[\text{illegible}] = [\text{illegible}] + \varphi(x) - \frac{\lambda^2}{24}\varphi''(x) - \frac{[\text{illegible}]}{5760}\varphi^{IV}(x)$$

$$\varphi\left(x+\frac{\lambda}{2}\right) + \varphi\left(x-\frac{\lambda}{2}\right) = \frac{1}{\lambda}\int_x^{x+\lambda} - \frac{1}{\lambda}\int_{x-\lambda}^{x} = \frac{1}{\lambda}\int_{x-\lambda}^{x+\lambda} f(x)\,dx$$

$$\frac{d}{dx}\left[\varphi\left(x+\frac{\lambda}{2}\right) + \varphi\left(x-\frac{\lambda}{2}\right)\right] = \frac{1}{\lambda}\left[f(x+\lambda) - f(x-\lambda)\right]$$

[illegible] [e Index : [illegible]]

$$\varphi(x) = \frac{1}{\lambda}\int_x^{x+\lambda} f(x)\,dx$$

$$\frac{d\varphi(x)}{dx} = \frac{1}{\lambda}\left[f(x+\lambda) - f(x)\right]$$

$$\varphi'(x+\lambda) = \frac{1}{\lambda}\left[f(x+2\lambda) - f(x+\lambda)\right]$$

$$\frac{d}{dx}\left[\varphi(x) + \varphi(x+\lambda)\right] = \frac{1}{\lambda}\left[f(x+2\lambda) - f(x)\right]$$

$$= 2\frac{d\varphi_2(x)}{dx}$$

$$\varphi_2(x) = \frac{1}{2\lambda}\int_x^{x+2\lambda} f(x)\,dx$$

$$\varphi_2(x) = \frac{1}{2}\left[\varphi_1(x) + \varphi_1(x+1)\right] + C_1$$

$$\varphi_1(x) = \frac{1}{2}\left[\varphi_{\frac{1}{2}}(x) + \varphi_{\frac{1}{2}}(x+1)\right] + C_2$$

$$\varphi_1(x+1) = \frac{1}{2}\left[\varphi_{\frac{1}{2}}(x+1) + \varphi_{\frac{1}{2}}(x+2)\right] + C_2$$

$$\varphi_2(x) = \frac{1}{2}\left[\frac{1}{2}\varphi_{\frac{1}{2}}(x) + \varphi_{\frac{1}{2}}(x+1) + \frac{1}{2}\varphi_{\frac{1}{2}}(x+2)\right] + C_1 +$$

$$= \frac{1}{4}\varphi_{\frac{1}{2}}(x) + \frac{1}{2}\varphi_{\frac{1}{2}}(x+1) + \frac{1}{4}\varphi_{\frac{1}{2}}(x+2) + C_1 +$$

etc etc.

$$f(x+\lambda) = \lambda\frac{d\varphi(x)}{dx} + f(x)$$

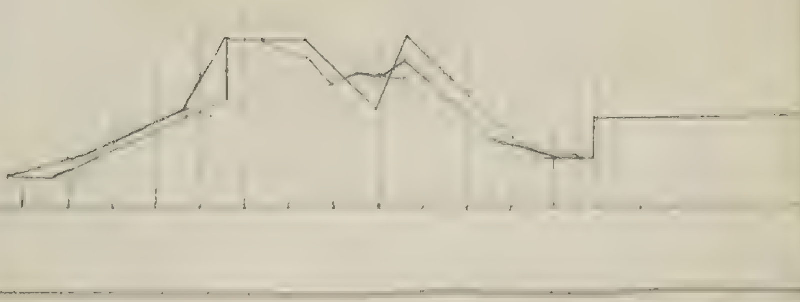
$$f(\lambda) = \lambda\frac{d\varphi(0)}{dx} + f(0)$$

$$f(2\lambda) = \lambda\frac{d\varphi(\lambda)}{dx} + f(\lambda)$$

$$= \lambda\left[\frac{d\varphi(\lambda)}{dx} + \frac{d\varphi(0)}{dx}\right] + f(0)$$

$$f(3\lambda) = \lambda\left[\frac{d\varphi(2\lambda)}{dx} + \frac{d\varphi(\lambda)}{dx} + \frac{d\varphi(0)}{dx}\right] + f(0)$$

etc. wenn also irgendwie $f(0)$ bekannt ist, so können daraus alle anderen gefunden werden



[illegible]

$$\frac{d^2x}{dt^2} = -k\frac{x}{r^3} \quad \Big| \quad \frac{dx}{dt}$$

$$\frac{d^2y}{dt^2} = -k\frac{y}{r^3} \quad \Big| \quad \frac{dy}{dt}$$

$$\frac{d}{dt}\left[\frac{dx}{dt}^2 + \frac{dy}{dt}^2\right] = -\frac{k}{r^3}\,\frac{dr}{dt}$$

$$\frac{d}{dt}\left[\frac{dr}{dt}^2 + r^2\frac{d\varphi}{dt}^2\right] = \frac{k}{2}\,\frac{d}{dt}\left(\frac{1}{r^2}\right)$$

$$\left(\frac{dr}{dt}\right)^2 + r^2\frac{d\varphi}{dt}^2 = \frac{k}{2r^2} + A$$

$$A = \frac{dr}{dt}_0^2 + r_0^2\frac{d\varphi}{dt}_0^2 - \frac{k}{2r_0^2}$$

$$r^2\frac{d\varphi}{dt} = 2c$$

$$\frac{dr}{dt}^2 + \frac{4c^2}{r^2} = \frac{k}{2r^2} - A$$

2

$$\left(\frac{dr}{dt}\right)^2 = \frac{k - \delta c^2}{2r^2} + A$$

$$\frac{dr}{\sqrt{\frac{k - \delta c^2}{2r^2} + A}} = dt$$

$$\frac{r\,dr\,\sqrt{2}}{\sqrt{k - \delta c^2 + 2Ar^2}} = dt$$

$$t = \frac{1}{A\sqrt{2}}\sqrt{k - \delta c^2 + 2Ar^2} + B$$

$$4A^2(t-B)^2 = k - \delta c^2 + 2Ar^2$$

$$r = \sqrt{\frac{2A^2(t-B)^2 + \delta c^2 - k}{2A}}$$

$$= \sqrt{\frac{1}{2}}\sqrt{2A(t-B)^2 + \frac{\delta c^2 - k}{A}}$$

$$\frac{4c^2}{r^4}\left(\frac{dr}{d\varphi}\right)^2 = \frac{k - \delta c^2}{2r^2} + A$$

$$8c^2\left(\frac{dr}{d\varphi}\right)^2 = (k - \delta c^2)r^2 + 2Ar^4$$

$$\frac{dr}{r\sqrt{(k - \delta c^2)r^2 + 2Ar^4}} = \frac{d\varphi}{2c\sqrt{2}}$$

$$2c = r^2 \frac{d\varphi}{dt}$$

$$= r^2 \frac{d\varphi}{dr} \frac{dr}{dt}$$

$$= \frac{r^2 \frac{d\varphi}{dr} \sqrt{2}}{\sqrt{k - 8c^2 r^2 + 2Ar^4}} \quad \frac{\sqrt{k - 8c^2 \text{[illegible]}}}{r \sqrt{2}}$$

$$\frac{\varphi}{2c\sqrt{2}} = \int \frac{dr}{r\sqrt{k - 8c^2 + 2Ar^2}} + C$$

I. $k - 8c^2 > 0$

$$\frac{\varphi}{2c\sqrt{2}} = -\frac{1}{\sqrt{k-8c^2}} \ln\left[\frac{\sqrt{k-8c^2} + \sqrt{k - 8c^2 + 2Ar^2}}{r}\right]$$

$$e^{C - \varphi \frac{\sqrt{k-8c^2}}{2c\sqrt{2}}} = \frac{\sqrt{k-8c^2} + \sqrt{k - 8c^2 + 2Ar^2}}{r}$$

$$\cancel{k - 8c^2} + 2Ar^2 = \cancel{k - 8c^2} + 2r\sqrt{k-8c^2}\, e^{C - \varphi \frac{\sqrt{k-8c^2}}{2c\sqrt{2}}} + r^2 e^{2\left(C - \varphi \frac{\sqrt{k-8c^2}}{2c\sqrt{2}}\right)}$$

$$r_1 = 0$$

$$r_2 = \frac{2\sqrt{k-8c^2}\, e^{C - \varphi \frac{\sqrt{k-8c^2}}{2c\sqrt{2}}}}{2A - e^{2\left(C - \varphi \frac{\sqrt{k-8c^2}}{2c\sqrt{2}}\right)}}$$

II. $k - 8c^2 < 0$

$$\varphi = -\frac{2c}{\sqrt{8c^2-k}} \arcsin \frac{1}{r}\sqrt{\frac{8c^2-k}{2A}} + Const$$

$$\frac{1}{r}\sqrt{\frac{8c^2-k}{2A}} = \sin \frac{(C-\varphi)\sqrt{8c^2-k}}{2c\sqrt{2}}$$

$$r = \sqrt{\frac{8c^2-k}{2A}} \; \frac{1}{\sin \frac{(C-\varphi)\sqrt{8c^2-k}}{2c\sqrt{2}}}$$

$t = \infty \quad r = \infty$

I. $C - \varphi_1 = 0 \qquad \varphi_1 = C$

$C - \varphi_2 = \pi \qquad \varphi_2 = C - \pi$

I.

$2A - $ [illegible]

$C - [illegible] \frac{\sqrt{[illegible]}}{[illegible]} = \log 2A$

$\varphi = C - \frac{c\sqrt{2}}{\sqrt{[illegible]}} \log 2A$

$t = 0 \qquad [illegible] = \sqrt{4A^2 + \frac{[illegible]}{[illegible]}}$

I. $\varphi = -\frac{2c\sqrt{2}}{\sqrt{k - kc^2}} \log \frac{[illegible] + 2\sqrt{2}\,[illegible]}{[illegible]} + C$

II.

$\varphi = -\frac{2c\sqrt{2}}{\sqrt{kc^2 - k}} \arcsin \sqrt{\frac{kc^2 - k}{2A}} \frac{1}{\sqrt{4A^2 + [illegible]}} + C$

$= -\frac{2c\sqrt{2}}{\sqrt{kc^2 - k}} \arcsin \sqrt{\frac{kc^2 - k}{2A^2c^2 + A^2 - k}} + C$

$= -\frac{2c\sqrt{2}}{\sqrt{kc^2 - k}} \arcsin \sqrt{\frac{1}{\frac{2A^2c^2}{kc^2 - k} + 1}} + C$

v_0

r_0

[illegible] $t = 0$

$\varphi = 0$ [illegible]

$\left(\frac{dr}{dt}\right)_0 = -v_0 \cos \varphi_0$

$\left(\frac{d\varphi}{dt}\right)_0 = \frac{1}{r_0} v_0 \sin \varphi_0$

$A = \ldots v_0 \cos \ldots$ [illegible] $\frac{k}{\ldots}$

$A = v_0^2 - \frac{k}{r_0}$ [illegible]

$2C = r_0^2 \frac{d\varphi}{dt}$ [illegible] $C = \frac{r_0 v_0 \sin \varphi_0}{2}$

$\cancel{A} \gtrless 0 \quad -\frac{\sqrt{k - 4C^2 \ldots 2 \ldots r_0}}{A\sqrt{2}} = \frac{0}{\ldots}$ [illegible]

$$B = - \frac{\sqrt{k^2 \cdot [illegible] + 2 v_0^2 r_0^2 - [illegible]}}{\sqrt{\left(v_0^2 - \frac{k}{2 r_0^2}\right)} \sqrt{2}}$$

$$\boxed{B = - \frac{\sqrt{v_0^2 r_0^2 - 4 c^2}}{v_0^2 - \frac{k}{2 r_0^2}}}$$

$$C = \frac{2 c \sqrt{2}}{\sqrt{8c^2 - k}} \arcsin \left[\frac{1}{\sqrt{2 \frac{r_0^4 [illegible]}{[illegible]} + 1}} \right]$$

$$= \frac{2 c \sqrt{2}}{\sqrt{8c^2 - k}} \cancel{\arcsin \left[\frac{1}{\sqrt{[illegible] \, c^2 r_0}} \right]}$$

$$= \frac{2 c \sqrt{2}}{\sqrt{8c^2 - k}} \arcsin \left[\frac{\sqrt{8c^2 - k}}{\sqrt{2 v_0^2 r_0^2 - k}} \right] + [illegible]$$

1945

10

[illegible]

$$= m\left[\frac{\partial u}{\partial r} + r\frac{\partial^2 u}{\partial r^2}\right]$$

$u = r^{\alpha} \cdot \beta$ [illegible]

[illegible]

$u =$ [illegible]

[illegible]

$$\frac{\partial^2 v}{\partial p^2} + \frac{\partial^2 v}{\partial \theta^2} = 0$$

$$u = \frac{\frac{c^2}{\mu}}{1 + \sqrt{1 + \frac{2c^2C}{\mu^2}}\cos\varphi}$$

$$\frac{v^2}{2} = \frac{\mu}{r} + C$$

$$C = \frac{v^2}{2}\Big|^{r=\infty}$$

$$\sqrt{1 + \frac{2c^2C}{\mu^2}}\cos\varphi_1 = -1$$

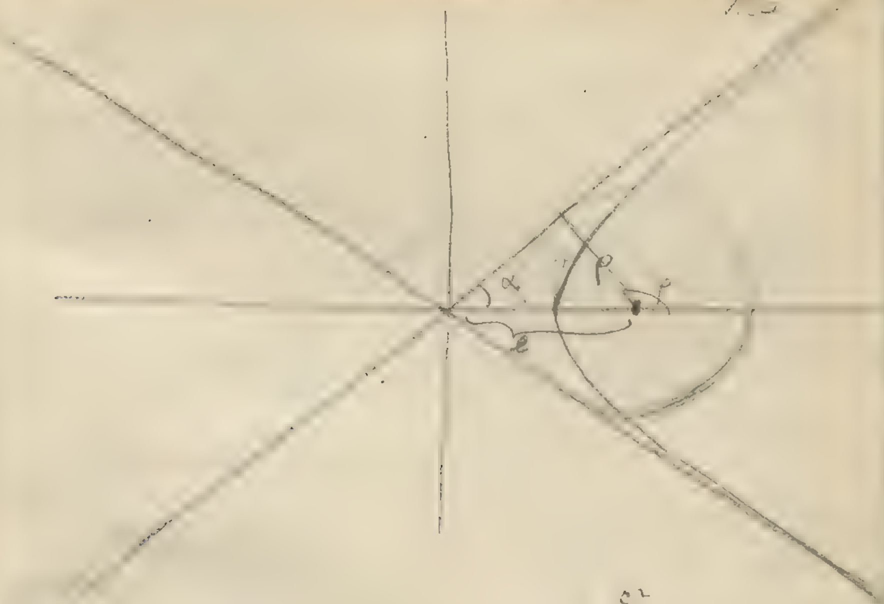
$$(\mu^2 + 2c^2C)\cos^2\varphi_1 = \mu^2$$

$$\cos\alpha\sqrt{1 + \frac{2c^2C}{\mu^2}} = -1$$

$$\cos^2\alpha\,(\mu^2 + 2c^2C) = \mu^2$$

$$c = \sqrt{\frac{\mu^2(1-\cos^2\alpha)}{2C}}$$

$$= \frac{\mu\sin\alpha}{\sqrt{2C}} = \frac{\mu\sin\alpha}{v}$$



$\rho = e \sin\alpha$

$$r = \frac{\frac{c^2}{\mu}}{1+\sqrt{1+\frac{c^2 v^2}{\mu^2}}\cos\varphi}$$

$\sqrt{} = \frac{e}{a}$

$\varphi = \pi$

$$r = \frac{\frac{\mu \sin^2\alpha}{v^2}}{1+\cos\varphi\sqrt{1+\sin^2\alpha}}$$

$$r_1 = \frac{\mu \sin^2\alpha}{v^2}\,\frac{1}{1+\sqrt{}}$$

$$r_2 = \frac{\mu \sin^2\alpha}{v^2}\,\frac{1}{1-\sqrt{}}$$

$$\frac{r_1 - r_2}{2} = a$$

$$= \frac{\mu}{v^2}\,\frac{\sqrt{1+\sin^2\alpha}}{}$$

$$e = a\sqrt{} = \frac{\mu}{v^2}\left(1+\sin^2\alpha\right)$$

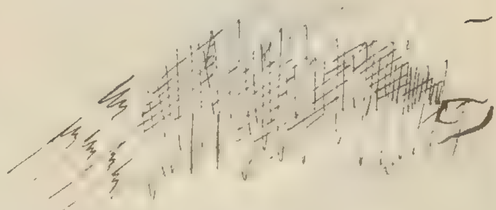
$$\rho = \frac{\mu \sin\alpha}{v^2}\left(1+\sin^2\alpha\right)$$

$$\frac{1}{2\pi}\int_0^{\frac{\pi}{2}} \sin [illegible] (1 + [illegible]) \, 2\pi \, [illegible] \, dx$$

$$= \cancel{1} \int_0^{\frac{\pi}{2}} \sin^2 x \, dx + \int \sin^4 x \, dx$$

$$= \frac{\pi}{4} + \frac{1 \cdot 3}{2 \cdot 4}\,\frac{\pi}{2} = \frac{7\pi}{16}$$

$$\rho = \frac{\mu}{v^2}\,\frac{7\pi}{16}$$

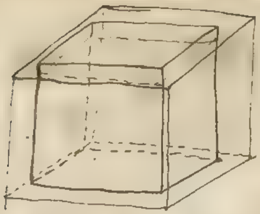


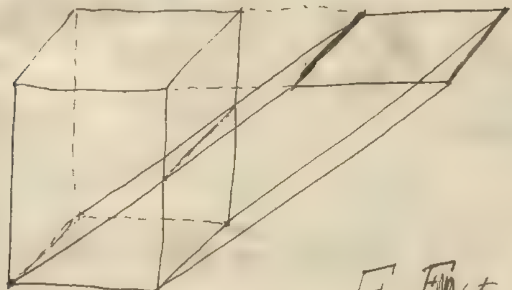
$$\frac{10^{-11}}{100^2} \cdot 6 \cdot 10^{-8} = 10^{-15} = 6 \cdot 10^{-23}$$

$t_1 \; p_1 \; C_1$ $$\int_{p_1}^{p_2} \frac{p\,dp}{\rho E} = \frac{p_2^2 - p_1^2}{2\rho E} = \frac{(p_2 - p_1)(p_2 + p_1)}{2\rho E}$$

$$\lambda = \int \frac{p}{\rho E}$$

$$\Delta\lambda = \frac{\Delta p}{\rho E}$$





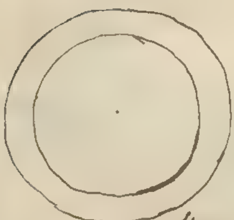
$v \quad E = F(t, p)$

$\theta = \varphi(p)$

$c = f(t, p)$

$l = \Phi(\theta)$

$\rho = r\left(1 + \frac{p}{E}\right)$



$$\int_{p_1}^{p_2} 4\pi r^2 \left(1 + \frac{p}{E}\right)^2 p\, r \frac{dp}{E} - \int_{p_1}^{p_2} \text{[illegible]} \; +$$

$$+ \int_{t_1}^{\theta+\tau} c_{p_2}\, dt + l_{p_2, \theta+\tau} + \int_{\theta+\tau}^{t_2} c'_{p_2}\, dt$$

$l = 1m$

$q = 1\ mm^2$

$\cancel{\ } P = 50kg$

$E = 10000$

$\frac{dE}{dt} = 0{,}0004 \cdot E$

$\cancel{0}0001$

$$\lambda = \frac{lP}{Eq} = \cancel{1} \frac{50}{10} = \cancel{5} = 5$$

$$\Delta Q = \frac{0005 \cdot 50}{2 \cdot 425} = \frac{0{,}05}{170} = \frac{1}{3400}\ Cal$$

850

$$\Delta t = \frac{\Delta Q}{q\, l\, c\, s} = \frac{1}{3400 \cdot 0{,}001 \cdot 10 \cdot 0{,}1} = \frac{1}{3{,}4}^{0} = 0{,}3^{0}$$

$$\frac{\Delta E}{E} = \frac{0{,}0004}{3} = 0{,}00012$$

$$\boxed{\Delta\lambda}_E = 0{,}0006$$

$\alpha = 0{,}00002$

$$\boxed{\Delta\lambda}_\alpha = 0{,}02 \cdot 0{,}3 = 0{,}006 = 0{,}1\ \%$$

$l = 1m$

$q = 1\ mm^2$

$\lambda = 1000\ mm$

$E = 0{,}1$

$P = 0{,}1\ kg$

$$P = \frac{\lambda E q}{l} =$$

$$A = \frac{\lambda P}{2}$$

$$\Delta \varphi = \frac{0{,}05}{425} = \frac{1}{8500}\ cal$$

Kreisprozess: $E, \theta, p, A, Q, \alpha, c, s$

1). θ_0, p_0

2). θ_0, p_1; A_2 ΔQ_2

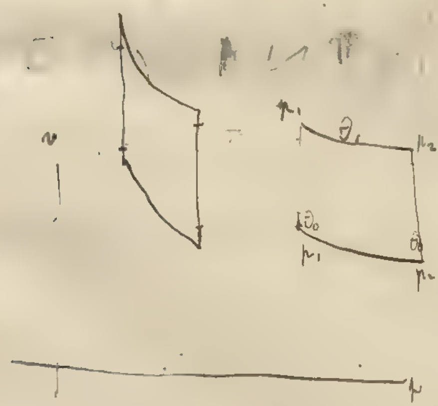
3). θ_1, p_1; $\Delta_E A_3 + \Delta_\alpha A_3$ $Q_3 = c_{(p)}(\theta_1 - \theta_0)s$

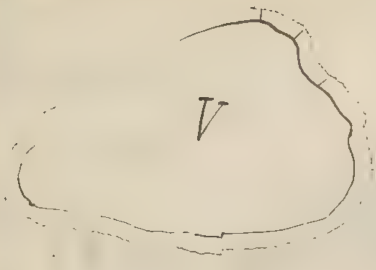
4). θ_1, p_0; A_4 ΔQ_4

5). θ_0, p_0; $\Delta_E A_5 + \Delta_\alpha A_5$ Q_5

$$\sum \frac{Q}{T} = 0$$

$c_f(\theta_1 - \theta_0) + l_1 + c_l(\theta_1 - \theta_1)$





$t_1 \;\; p_1$

$t_1 \;\; p_2$

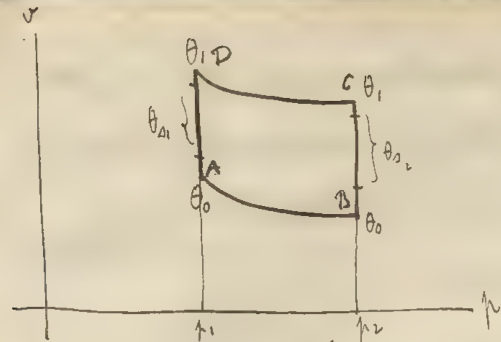
$t_2 \;\; p_2$

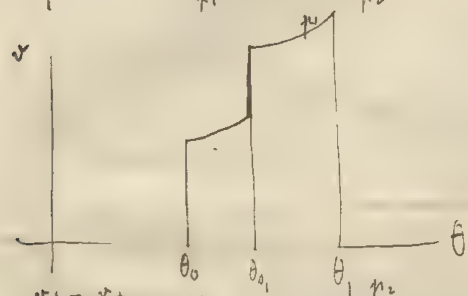
$t_2 \;\; p_1$

1). $t_1, \; p_1$

2). $t_1, \; p_2$ $\qquad A = \dfrac{(p_2^2 - p_1^2)}{2 K_{t_1} V}$ $\qquad \mathfrak{Q} =$

$$\int \frac{d\mathfrak{Q}}{T} = 0$$





$v_A - v_B$

$$\cancel{y_A - y_B} = \cancel{\int \frac{dp}{vK}} = \int_{p_1}^{p_2} \frac{dp}{vK}$$

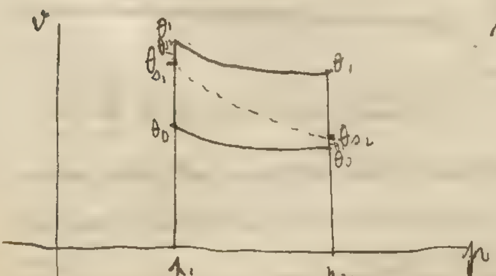
$$v_C - v_B = \int_{\theta_0}^{\theta_{s_2}} v\alpha \, d\theta + \int_{\vartheta_{s_2}}^{\theta_1} v_1 \, \delta \, d\theta + \left(\frac{1}{s_{I_p}} - \frac{1}{s_{II_p}}\right) v$$

Anmärkning:

$$v_A - v_B = \frac{p_2 - p_1}{v K_I} \qquad v_D - v_C = \frac{p_2 - p_1}{v K_{II}} \qquad \theta_{s_1} > \vartheta_{s_2}$$

$$v_D - v_A = v\alpha(\theta_{s_2} - \theta_0) + v\alpha(\theta_{s_1} - \theta_{s_2}) +$$

$$A = (p_1 - p_2)\frac{(v_D - v_A + v_C - v_B)}{2}$$



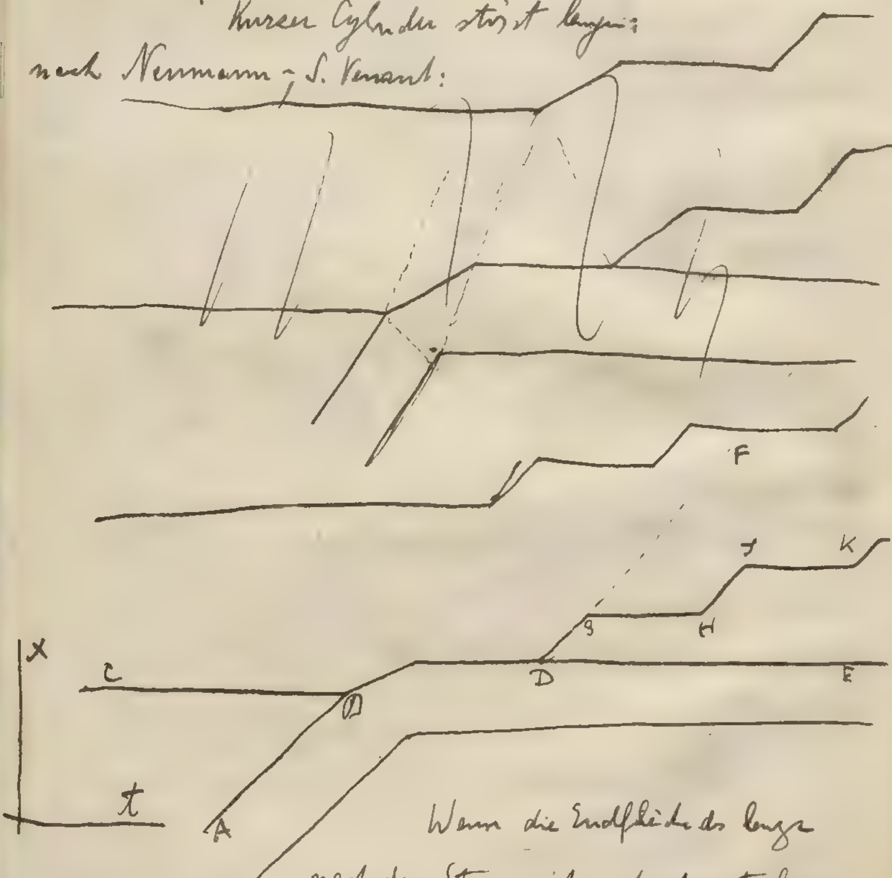
? Ob sich nicht die Abweichungen der Voigt'schen Stoss-Experimente von der elastischen Theorie durch Wirkung der Luftschichte zwischen den beiden Körpern erklären?

Stefan Scheinbare Adhäsion

$$\cancel{t = \frac{3\pi\mu R^4}{4g}\left[\frac{1}{e^2} - \frac{1}{x^2}\right]}$$

Kurzer Cylinder stösst langen:

nach Neumann – S. Venant:



Wenn die Endfläche des langen nach dem Stosse sich constant weiter längen würde [D G F] so wäre die Wirkung der Luft vor dem Stosse annähernd gleich jener nach dem Stosse, nur entgegengesetzt

Nun kommen aber die Rutepausen SH, JK etc., während welcher die Luft einströmen kann; daher wird die verwerfende Kraft nach dem Stoße geringer sein als die trennende vor dem Stoße

~~Im Allgemeinen Wirkung einer Reibung daher Annäherung an~~ ...

~~unelastischen Stoß.~~

Die mechanische Theorie des elastischen Stoßes würde stimmen wenn z.B. zwischen die stoßenden Körper ein sehr biegsames elastisches Hörnchen z.B. eine Spiralfeder eingelegt wäre. Die eingeklemmte Luft wirkt auch als so ein Polster daher Annäherung an letztere der mechanischen Theorie.

Die ~~[illegible]~~ Kraft welche im Momente t, wo die ~~Platten~~ Endflächen um α ~~auseinander~~ sind, und die ~~[illegible]~~ relative Geschwindigkeit $\frac{d\alpha}{dt}$ haben ist:

(bei Cylindern mit Radius R): $$q = \frac{3\pi\mu}{2\alpha^3} R^4 \frac{d\alpha}{dt}$$

$t = -\infty$:

$\frac{\partial u}{\partial t} = c_1$ $\qquad$ für $-\xi < x < -(\xi + a_1)$

$\frac{\partial u}{\partial t} = c_2$ $\qquad$ $\underbrace{\alpha - \xi < x < \alpha - \xi}_{=} + a_2$

$\xi : \alpha - \xi = c_1 : c_2$ $\qquad$ $\frac{c_2}{c_1}\xi < \alpha < \frac{c_2}{c_1}\xi + a_2$

$\alpha - \xi = \frac{c_2}{c_1}\xi$

$\alpha = \frac{c_1 + c_2}{c_1}\xi$

$\frac{\partial u}{\partial t} = \omega f'(\alpha + \omega t) - \omega \varphi'(\alpha - \omega t)$

$\frac{c_1}{\cdot} =$ $\qquad$ $\xi = \infty$

$$\begin{cases} f'(x) = \frac{c_1}{2\omega} & \varphi'(x) = -\frac{c_1}{2\omega} & -\xi < x < -(\xi + a_1) \\ f'(x) = \frac{c_2}{2\omega} & \varphi'(x) = -\frac{c_2}{2\omega} & \frac{c_2}{c_1}\xi < x < \frac{c_2}{c_1}\xi + a_2 \end{cases}$$

$\frac{\partial u}{\partial x} = 0$

$$X_x = \left(2K \frac{1+3L}{1+2L}\right) \frac{\partial u_0}{\partial x} = A \frac{\partial u_0}{\partial x}$$

$$\underbrace{A\left(\frac{\partial u_0}{\partial x}\right)_1 = A\left(\frac{\partial u_0}{\partial x}\right)_2} = \underbrace{\frac{3\pi\mu}{2}R^4} \frac{1}{\alpha^3} \frac{d\alpha}{dt}$$

$$= B \frac{1}{\alpha^3} \frac{d\alpha}{dt}$$

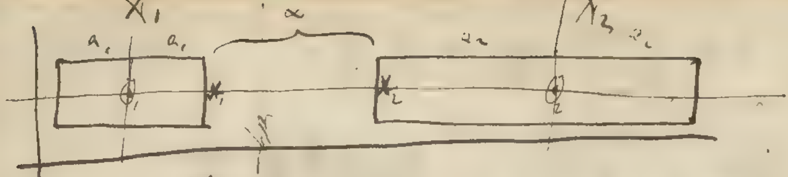
$$x_1 = -\xi$$

$$x_2 = \alpha - \xi$$

$$\frac{\partial u_0}{\partial x} = 0 \qquad x_1 = -(\xi + a_1)$$

$$x_2 = \alpha - \xi + a_2$$

u



$$m_1 \frac{\partial^2 X_1}{\partial t^2} = + \frac{B}{\alpha^3} \frac{d\alpha}{dt} \qquad m_1 \frac{dX_1}{dt} = -\frac{B}{2\alpha^2} + c_1 m_1$$

$$m_2 \frac{d^2 X_2}{dt^2} = - \frac{B}{\alpha^3} \frac{d\alpha}{dt} \qquad m_2 \frac{dX_2}{dt} = +\frac{B}{2\alpha^2} + c_2 m_2$$

$$\alpha = X_2 - X_1 - (a_1 + a_2) - (u_1|_{x=l_1} + u_2|_{x=l_2})$$

$$\frac{\partial^2 u}{\partial t^2} = \omega^2 \frac{\partial^2 u}{\partial x^2}$$

$$\begin{cases} x = -l_1 & \left| \ \frac{\partial u}{\partial x} = 0 \right. \\ x = +l_1 & \left| \ A_1 \frac{\partial u}{\partial x} = \frac{B}{\alpha^3} \frac{d\alpha}{dt} = -\frac{B}{2} \frac{d\left(\frac{1}{\alpha^2}\right)}{dt} \right. \end{cases}$$

$t = -T$: $u = g(x) \quad -l_1 < x < +l_1$

$\frac{\partial u}{\partial t} = \omega h(x)$

$$u = f(x + \omega t) + \varphi(x - \omega t)$$

$$f(x + \omega T) + \varphi(x - \omega T) = g(x)$$

$$\omega f'(x + \omega T) - \omega \varphi'(x - \omega T) = h(x)$$

$$= g'(x)$$

$$\frac{\partial u}{\partial t} = \omega f'(x + \omega t) - \omega \varphi'(x - \omega t)$$

$$\cancel{m_1\frac{dX_1}{dt} + m_2\frac{dX_2}{dt} = m_1c_1 + m_2c_2}$$

$$\frac{d\alpha}{dt} = \frac{dX_2}{dt} - \frac{dX_1}{dt} - \left(\frac{du_1}{dt} + \frac{du_2}{dt}\right)$$

$$= \frac{+B}{2\alpha^2 m_1} + \frac{+B}{2\alpha^2 m_2} - c_1 + c_2 - \left(\frac{du_1}{dt} + \frac{du_2}{dt}\right)$$

$$\cancel{= -\frac{B}{2\alpha^2}\frac{1}{m_1}}$$

$$= + \frac{B(m_2+m_1)}{2m_1m_2}\frac{1}{\alpha^2} - - - -$$

$$\cancel{\frac{d(\alpha+u_1+u_2)}{dt}} \qquad \frac{d(\alpha+u_1+u_2)}{dt} = + \frac{B(m_2+m_1)}{2m_1m_2}\frac{1}{\alpha^2} + c_2 - c_1$$

$\cancel{A_1}$

$$\left.\begin{aligned} f'(x+\omega T) &= \tfrac{1}{2}\left(h(x) + g'(x)\right) \\ \varphi'(x-\omega T) &= \tfrac{1}{2}\left(-h(x) + g'(x)\right) \\ f(x+\omega T) &= \tfrac{1}{2}\left[g(x) + \int h(x)\,dx\right] \\ \varphi(x-\omega T) &= \tfrac{1}{2}\left[g(x) - \int h(x)\,dx\right] \end{aligned}\right\} -l_1 < x < +l_1$$

$$f(-l_1+\omega t) + \varphi(-l_1-\omega t) = 0$$

$$A_1\left\{f'(l_1+\omega t) + \varphi'(l_1-\omega t)\right\} = -\frac{B_1}{2}\frac{d\left(\frac{1}{\alpha^2}\right)}{dt}$$

$$u_1 = a_1 + \frac{b_1}{t} + \frac{c_1}{t^2} + \frac{d_1}{t^3} + \frac{e_1}{t^4} + \frac{f_1}{t^5} +$$

$$u_2 = a_2 + \frac{b_2}{t} + \frac{c_2}{t^2} + \frac{d_2}{t^3} + \text{———}$$

$$a_1\ b_1\ \cdots = f(x)$$

$$\frac{\partial u_1}{\partial t} = -\left[\frac{b_1}{t^2} + \frac{2 b_2}{t^3} + \frac{3 d_3}{t^4} + \right.$$

$$\frac{\partial^2 u_1}{\partial t^2} = + 2\frac{b_1}{t^3} + 2.3\frac{d_2}{t^4} + 3.4\frac{d_3}{t^5} + \cdots$$

$$\cancel{2\frac{b_1}{t^3} + 2.3\frac{b_2}{t^4} + 3.4\frac{b_4}{t^5} + \cdots = \partial^2 a_1}$$

$$2\frac{b_1}{t^3} + 2.3\frac{c_1}{t^4} + 3.4\frac{d_1}{t^5} + \cdots \cdots =$$

$$\frac{\partial^2 a_1}{\partial x^2} + \frac{1}{t}\frac{\partial^2 b_1}{\partial x^2} + \frac{1}{t^2}\frac{\partial^2 c_1}{\partial x^2} + \cdots\cdots$$

$$\frac{\partial^2 a_1}{\partial x^2} = 0 \qquad 2 b_1 = \frac{\partial^2 d_1}{\partial x^2}$$

$$\frac{\partial^2 b_1}{\partial x^2} = 0 \qquad 2.3.c_1 = \frac{\partial^2 e_1}{\partial x^2}$$

$$\frac{\partial^2 c_1}{\partial x^2} = 0 \qquad 3.4.d_1 = \frac{\partial^2 f_1}{\partial x^2}$$

———

$$a_1 = M_1 x + N_1$$

$$b_1 = M_2 x + N_2$$

$$c_1 = M_3 x + N_3$$

$$d_1 = M_2 \frac{x^3}{3} + N_2 x^2 + O_2 x + P_2$$

$$e_1 = M_3 \frac{x^3}{3} + 3 N_3 x^2 + O_3 x + P_3$$

$$2M_2x+2N_2=\frac{d^2d_1}{dx^2}$$

$$M_2x^2+2N_2x+O_2=\frac{d\,d_1}{dx}$$

$$M_2\frac{x^3}{3}+N_2x^2+O_2x+P_2=d_1$$

$$\frac{d^2f_1}{dx^2}=3.4.\left[P_2+O_2x+N_2x^2+M_2\cdot\frac{x^3}{3}\right]$$

$$\frac{df_1}{dx}=3.4.\left[P_2x+O_2\frac{x^2}{2}+N_2\frac{x^3}{3}\right]+M_2x^4+Q_4$$

$$f_1=3.4\left[P_2\frac{x^2}{2}+O_2\frac{x^3}{2.3}+N_2\frac{x^4}{3.4}\right]+M_2\frac{x^5}{5}+Q_4x+R_4$$

$$=\cancel{6P_2x^2}$$

$$f_1=M_2\frac{x^5}{5}+N_2x^4+2\cdot O_2x^3+6P_2x^2+Q_4x+R_4$$

$$\left\{\begin{array}{l}-\frac{B}{2}\,\frac{m_2+m_1}{m_1m_2}\cdot\frac{1}{\alpha^2}=\frac{d(\alpha+u_1+u_2)}{dt}+c_1-c_2\\ A_1\,\frac{\partial u_1}{\partial x}=-\frac{B}{2}\,\frac{d}{dt}\left(\frac{1}{\alpha^2}\right)\end{array}\right\}\Big\|\,x=a_1$$

$$A_1\,\frac{m_2+m_1}{m_1m_2}\,\frac{\partial u_1}{\partial x}=\frac{d^2}{dt^2}(\alpha+u_1+u_2)\quad\Big\|\,x=l_1$$

$$=\cancel{\frac{d^2}{dt^2}\left[X_2-X_1+(a_2+a_1)\right]}$$

$$=$$

$$2A_1\left\{\frac{1}{t}\frac{\partial b_1}{\partial x}+\frac{1}{t^2}\frac{\partial c_1}{\partial x}+\frac{1}{t^3}\frac{\partial d_1}{\partial x}+\frac{1}{t^4}\frac{\partial e_1}{\partial x}+\frac{1}{t^5}\frac{\partial f_1}{\partial x}+\right.$$

$$=-B\,\frac{d\left(\frac{1}{\alpha_2}\right)}{dt}$$

damit einer der beiden Stäbe zurückspringt, müsste ein Moment sein, wo $\frac{dX_1}{dt}$ oder $\frac{dX_2}{dt}=0$ also:

$$\underbrace{-\frac{B}{2\alpha^2}+c_1 m_1=0}_{} \quad \text{oder} \quad \underbrace{+\frac{B}{2\alpha^2}+c_2 m_2=0}_{\text{verlangt ein } c_2<0}$$

$$\frac{B}{2\alpha^2}=m_1 c_1$$

$$\alpha=\sqrt{\frac{B}{2m_1 c_1}}$$

dann ist:

$$m_2\frac{dX_2}{dt}=m_2 c_2+m_1 c_1$$

A

Wenn die Länge der störenden Cylinder im Verhältnis zu ihrem Querschnitt sehr kurz ist, so dass diese als Scheiben betrachtet werden können, wird die elektrische Verschiebung sehr klein werden; wenn man angenähert annimmt:

$$\frac{dX}{dt} = \frac{d\alpha}{dt} \quad ; \quad \text{so wird sein:}$$

$$m_1 \frac{dx}{dt} = + \frac{B}{2x^2} - m_1 c_1$$

$$\frac{dx}{dt} - \frac{B}{2m_1} \frac{1}{x^2} + c_1 = 0$$

$$\frac{dx}{\frac{B}{2m_1}\frac{1}{x^2} - c_1} = dt$$

$$\int \frac{x^2 dx}{\frac{B}{2m_1} - c_1 x^2} = \int dt$$

$$\int \frac{\frac{2m_1}{B} x^2}{1 - \frac{2m_1 c_1}{B} x^2} dx = t + C$$

$$\int \frac{x^2 dx}{1 - x^2} = \int \frac{1}{2}\left\{\frac{-x}{1+x} + \frac{x}{1-x}\right\} dx$$

$$1 + x = y$$

$$J_1 = \int \frac{y-1}{y} dy = y - \lg y$$
$$= (1+x) - \lg(1+x)$$

$$1 - x = y$$

$$J_2 = -\int \frac{1-y}{y} dy = -\lg y + y$$
$$= (1-x) - \lg(1-x)$$

$$J = \frac{1}{2}\left\{-2x + \lg \frac{1+x}{1-x}\right\}$$
$$= -x + \lg \sqrt{\frac{1+x}{1-x}}$$

$$x\sqrt{\frac{2m_1 c_1}{B}} = y$$

$$x = \sqrt{\frac{B}{2m_1 c_1}}\, y$$

$$= \int \frac{2m_1}{B} \frac{B}{2m_1 c_1} \sqrt{\frac{B}{2m_1 c_1}}$$

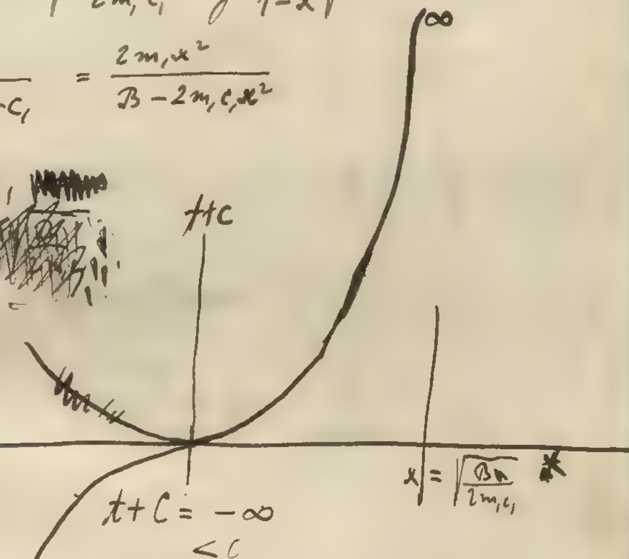
$$t+C = \sqrt{\frac{B}{2m_1c_1^3}}\left\{ -x\sqrt{\frac{2m_1c_1}{B}} + \log\sqrt{\frac{1+x\sqrt{\frac{2m_1c_1}{B}}}{1-x\sqrt{\frac{2m_1c_1}{B}}}}\right\}$$

$$\cancel{= -\frac{x}{c_1} + \sqrt{\frac{B}{2m_1c_1^3}}\log\sqrt{}}$$

$$= -\frac{x}{c_1} + \frac{1}{2}\sqrt{\frac{B}{2m_1c_1^3}}\log\frac{1+x\sqrt{\frac{2m_1c_1}{B}}}{1-x\sqrt{}}$$

$$\frac{dt}{dx} = \frac{1}{\frac{B}{2m_1}\frac{1}{x^2}-c_1} = \frac{2m_1x^2}{B-2m_1c_1x^2}$$

z. B.: $x = 0$,



$x = -\sqrt{\frac{B}{2m_1c_1}}$ $\quad t+C = -\infty$

$< C$

$\cancel{x = -\ldots}$

$x = 0$ $\quad t+C = 0$

$x = +\ldots$

was wenn $x > \sqrt{}$?!

das wenn Geschwindigkeit der

~~Schlag von Richtung der Geschw.~~

Theile gegen die feste Wand

~~von der Wand weg~~

also asymptotische Annäherung für $t=\infty$ an den Punkt $x=\sqrt{}$ –

$$m_1 \frac{dx}{dt} = \frac{B}{2x^2} + m_1 c_1 \qquad x\sqrt{\frac{2m_1c_1}{B}} = y$$

$$\frac{dx}{\frac{B}{2m_1x^2} + c_1} = dt$$

$$t + C = \int$$

$$= \sqrt{\frac{B}{2m_1c_1^3}}\left\{\int \frac{y^2dy}{1+y^2}\right\}$$

$$\int \frac{y^2dy}{1+y^2} = y - \int \frac{dy}{1+y^2} = y - \operatorname{arctg} y$$

$$t + C = \sqrt{\frac{B}{2m_1c_1^3}}\left\{x\sqrt{\frac{2m_1c_1}{B}} - \operatorname{arctg} x\sqrt{\frac{2m_1c_1}{B}}\right\}$$

$$= \frac{x}{c} - \sqrt{\frac{B}{2m_1c_1^3}} \operatorname{arctg} x\sqrt{\frac{2m_1c_1}{B}}$$

$$\frac{dt}{dx} = \frac{2m_1x^2}{B + 2m_1x^2c_1}$$

$M A$: $x = 0 \qquad t + C = 0$

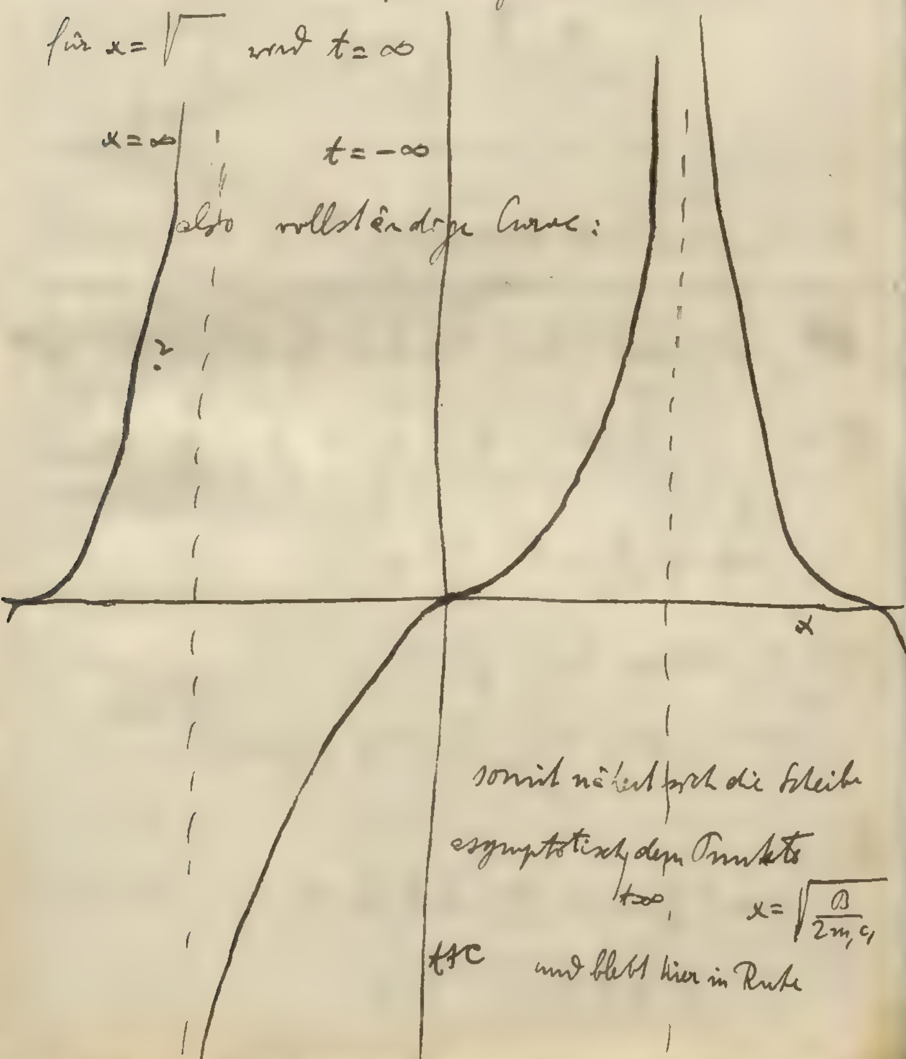
Ad frühere Annahme: c_1

eine Lösung ist auch:

$$t+C = -\frac{x}{c_1} + \frac{1}{2}\sqrt{\frac{B}{2m_1c_1^3}}\,\log\left\{\frac{x\sqrt{\frac{2m_1c_1}{B}}+1}{x\sqrt{}-1}\right\}$$

dies gilt für $x > \sqrt{\frac{B}{2m_1c_1}}$ also gewöhnlicher Fall

für $x = \sqrt{}$ wird $t = \infty$

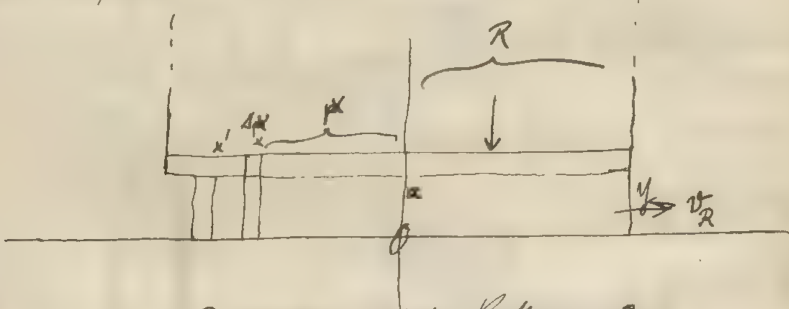


somit nähert sich die Scheibe asymptotisch dem Punkte $x = \sqrt{\frac{B}{2m_1c_1}}$ und bleibt hier in Ruhe

$t\infty$

Vorübung:

kreisförmige
Eine Platte bewegt sich mit der konstanten Geschwindigkeit c senkrecht gegen eine Wand (in Luft); welches sind die durch Reibung und Kompression der Luft entstehenden Kräfte?



Annahme: für $x = R$ sei Dichtigkeit der Luft $= \rho = \rho_0$

I). In jedem Zeitmomente muss: verdrängte Luftmasse = ausweichende + Verdichtung

$$\int_0^R \rho\, 2\pi x\, dx \cdot \Delta a = 2\pi R . a . v_R\, \Delta t + \int_0^R 2\pi x\, dx . a \frac{\partial\rho}{\partial t}\Delta t$$

$$\frac{\Delta a}{\Delta t} = c \qquad \int_0^R \rho x\, dx = \frac{a R}{c} \cdot v_R + \frac{a}{c}\int_0^R \frac{\partial\rho}{\partial t} x\, dx$$

$$\int_0^R \left[\rho - \frac{a}{c}\frac{\partial\rho}{\partial t}\right] x\, dx = \frac{a R}{c} v_R$$

Ebenso für beliebigen Punkt x:

$$\int_0^x \rho x\, dx = \frac{a x}{c} v + \frac{a}{c}\int_0^x \frac{\partial\rho}{\partial x} x\, dx$$

$\frac{\partial}{\partial x}$:

$$\rho x = \frac{a}{c}\left(v + x\frac{\partial v}{\partial x}\right) + \frac{a}{c}\frac{\partial\rho}{\partial x}\cdot x$$

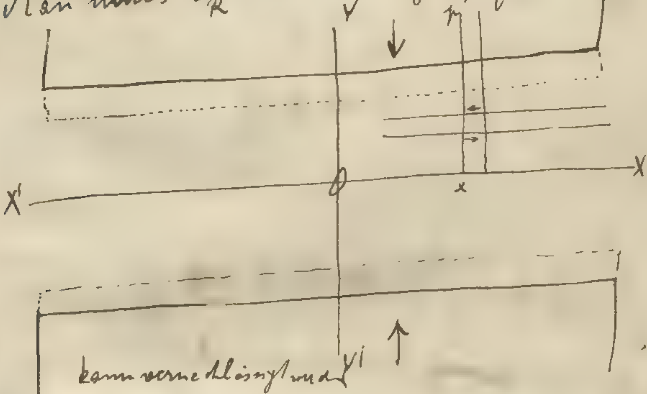
$$\rho = \frac{a}{c}\frac{v}{x} + \frac{a}{c}\frac{\partial v}{\partial x} + \frac{a}{c}\frac{\partial\rho}{\partial x}$$

$$\int \rho\, dx = \frac{a}{c}\int \frac{v}{x}\,dx + \frac{a}{c}(v+\rho) + \text{Const}$$

II). Kräfte die auf ein Volumelement wirken
Arbeit bei Vorrückung des Elementes von x nach x'

$\Delta\varphi\, x\, dx\,.\,a\,.\,\rho$

Man muss v_R ~~auch~~ und überhaupt v_x in Bezug auf y als variabel ansehen



$$\overbrace{\frac{d}{dt}\left[\underbrace{x\,dx\,\Delta\varphi\,dy}_{V}\,.\,\rho\,.\,\frac{u^2}{2}\right]}^{\text{kann vernachlässigt werden}}\Delta t = -\,x\,dx\,\Delta\varphi\,dy\,\frac{\partial p}{\partial x}\underbrace{\Delta x}_{[=u\Delta t]}$$

$$-\mu x\,\Delta\varphi\,dx\,\frac{\partial^2 u}{\partial y^2}\,dy\,\underbrace{\Delta x}_{=u\Delta t}$$

denn:
Druckarbeit:
an der oberen Fläche Kraft $\mu x\,\Delta\varphi\,dx\,\frac{\partial u}{\partial y}$
an der unteren " $\mu x\,\Delta\varphi\,dx\left(\frac{\partial u}{\partial y}\right)_{y+\Delta y}$

Resultante $\mu x\,\Delta\varphi\,dx\,\frac{\partial^2 u}{\partial y^2}\,\Delta y$

$$\frac{\partial p}{\partial x} = -\mu \frac{\partial^2 u}{\partial y^2} \qquad \leftarrow \frac{\partial}{\partial y}$$

$$\frac{\partial p}{\partial y} = 0 \qquad \frac{\partial}{\partial y}\left(\frac{\partial p}{\partial x}\right) = \frac{\partial}{\partial x}\left(\frac{\partial p}{\partial y}\right) = 0 = -\mu \frac{\partial^3 u}{\partial y^3}$$

II Verdrängte Masse

$$\int_0^x 2\pi x \, dx \, \rho_0 \cdot \frac{\Delta a}{\Delta t} = 2\pi x \int_0^a u \, dy + \int_0^x 2\pi x \, dx \cdot a \frac{\partial \rho}{\partial t}$$

$$c \int_0^x x \, dx \cdot \rho = x \int_0^a u \, dy + \int_0^x x \, dx \cdot a \frac{\partial \rho}{\partial t}$$

$\frac{\partial}{\partial x}$:

$$c\, x \cdot \rho_0 = \int_0^a u \, dy + x \int_0^a \frac{\partial u}{\partial x} \, dy + x\, a \frac{\partial \rho}{\partial t}$$

auch direkt für einen Hohlzylinder der Dicke Δx:

$$c\, \rho\, 2\pi x\, \Delta x \cdot \frac{\Delta a}{\Delta t} = 2\pi x \int_0^a u \, dy - 2\pi(x + \Delta x) \int_0^a (u + \Delta u) \, dy$$

$$+ 2\pi x\, \Delta x \cdot a \frac{\partial \rho}{\partial t}$$

$$c\rho\, 2\pi x\, \Delta x = -2\pi \Delta x \int_0^a u \, dy - 2\pi x \int_0^a \frac{\partial u}{\partial x} dy\, \Delta x + 2\pi x\, \Delta x\, a \frac{\partial \rho}{\partial t}$$

wie oben:

$$c\, x\, \rho_0 = \int_0^a u \, dy + x \int_0^a \frac{\partial u}{\partial x} dy + a\, x \frac{\partial \rho}{\partial t}$$

III $\frac{p}{p_0} = \frac{\rho}{\rho_0}$ $\qquad \rho = A\, p$

$$\frac{\cancel{\partial \Pi}}{\partial y}: \quad \cancel{\partial \Pi} \; \frac{\cancel{\partial p}}{\partial y} =$$

$$\frac{\partial \Pi}{\partial x}: \quad c p + c x \frac{\partial p}{\partial x} = 2 \int_0^a \frac{\partial u}{\partial x} \, dy + x \int_0^a \frac{\partial^2 u}{\partial x^2} \, dy + a \frac{\partial \rho}{\partial t} + a x \frac{\partial^2 (\rho x)}{\partial t \, \partial x}$$

---

ebenso für einen Hohlzylinder von der Dicke Δy in der Höhe y:

$$2\pi x \Delta x \Delta y \left(\frac{\partial \rho}{\partial t} + \frac{\partial (\rho v)}{\partial y} \right) + 2\pi x \Delta x \Delta y - 2\pi x \, \rho u \, \Delta y - 2\pi (x + \Delta x) \left[\rho u + \frac{\partial (\rho u)}{\partial x} \Delta x \right] \Delta y = 0$$

$$\frac{\partial \rho}{\partial t} + \frac{\partial (\rho v)}{\partial y} + \underbrace{\frac{\partial (\rho u)}{\partial x} + \frac{1}{x} \rho u}_{=\ \frac{1}{x} \frac{\partial (\rho u x)}{\partial x}} = 0$$

$$\frac{\partial \rho}{\partial t} + \rho \frac{\partial v}{\partial y} + \frac{\partial (\rho u)}{\partial x} + \frac{\rho u}{x} = 0$$

$$\frac{\partial^2}{\partial y^2}: \quad \rho \frac{\partial^3 v}{\partial y^3} + \underbrace{\frac{\partial \left(\rho \frac{\partial^2 u}{\partial y^2} \right)}{\partial x} + \frac{\rho}{x} \frac{\partial^2 u}{\partial y^2}}_{\frac{1}{x} \frac{\partial \left[\rho x \frac{\partial^2 u}{\partial y^2} \right]}{\partial x}} = 0$$

$$\rho \frac{\partial^3 v}{\partial y^3} = \frac{1}{x \mu} \frac{\partial \left[\rho x \frac{\partial p}{\partial x} \right]}{\partial x} = \frac{A}{2 x \mu} \frac{\partial \left[x \frac{\partial (p^2)}{\partial x} \right]}{\partial x}$$

$$\mu \rho \frac{\partial^3 v}{\partial y^3} = \frac{\partial \left(\rho \frac{\partial p}{\partial x} \right)}{\partial x} + \frac{1}{x} \rho \frac{\partial p}{\partial x}$$

$$= \frac{\partial \rho}{\partial x} \frac{\partial p}{\partial x} + \rho \frac{\partial^2 p}{\partial x^2} + \frac{\rho}{x} \frac{\partial p}{\partial x}$$

$$= A \left(\frac{\partial p}{\partial x} \right)^2 + A p \frac{\partial^2 p}{\partial x^2} + A \frac{p}{x} \frac{\partial p}{\partial x}$$

$$\frac{\partial^4 v}{\partial y^4} = 0 \qquad v = c_0 + c_1 y + c_2 y^2 + c_3 y^3$$

$$c = f(x,t)$$

$$\frac{\partial^3 v}{\partial y^3} = \underset{y}{\text{const}} = c_3$$

$$\frac{\partial^3 v}{\partial y^3}\, \rho = -\frac{1}{x} \cdot \frac{\partial\left(\rho x \frac{\partial^2 u}{\partial y^2}\right)}{\partial x}$$

$$\frac{\partial^3 v}{\partial y^3}\, \rho x = -\frac{\partial}{\partial x}\left[\rho x \frac{\partial^2 u}{\partial y^2}\right] = \frac{1}{\mu}\frac{\partial}{\partial x}\left[\rho x \frac{\partial p}{\partial x}\right]$$

$$\mu a_3 \rho x = \frac{\partial}{\partial x}\left[\rho x \frac{\partial p}{\partial x}\right] = \frac{\partial(\rho x)}{\partial x}\frac{\partial p}{\partial x} + \rho x \frac{\partial^2 p}{\partial x^2}$$

$$\frac{\partial^2 p}{\partial x^2} + \frac{1}{\rho x}\frac{\partial(\rho x)}{\partial x}\frac{\partial p}{\partial x} = \mu a_3$$

$$\frac{\partial^2 p}{\partial x^2} + \frac{\partial\left[\log(\rho x)\right]}{\partial x}\frac{\partial p}{\partial x} = \mu a_3$$

$$\underbrace{\frac{\frac{\partial^2 p}{\partial x^2}}{\frac{\partial p}{\partial x}}}_{\frac{\partial\left(\log \frac{\partial p}{\partial x}\right)}{\partial x}} \partial x + \frac{\partial \log(\rho x)}{\partial x}\partial x = \frac{\mu a_3}{\frac{\partial p}{\partial x}}\, \partial x$$

$$\frac{\partial \log\left(\rho x \frac{\partial p}{\partial x}\right)}{\partial x} \cdot \frac{\partial p}{\partial x} = \mu \frac{\partial^3 v}{\partial y^3}$$

$u = a_0 + a_1 y + a_2 y^2 +$ $\qquad a = fc(x\,t)$

$p = f(x, t)$

$\frac{\partial p}{\partial x} = -2\mu a_2$ falsch! $\qquad p = b_0 - 2\mu \int a_2\, dx$

$b = fc(t)$

$\cancel{p = b_0 - 2 a_2 \mu x +}$

für $x = R$ bleibt p = konstant $= p_0$

$p_0 = (b_0) - 2(a_2)\mu R +$

$(b_0) = p_0 + 2(a_2)\mu R$

~~IV auch in der Form:~~

$\cancel{\frac{\partial p}{\partial t} + p\frac{\partial v}{\partial y} + \frac{1}{x}\frac{\partial(p u x)}{\partial x} = 0}$

$\cancel{\frac{\partial^2 p}{\partial x^2} = -2\mu \frac{\partial a_2}{\partial x} = -\mu}$

für $x = R$

$p = p_0 + 2(a_2)\mu(R - x)$

$\downarrow$

$= fc(t)$

~~IV in der Form:~~

$\cancel{\frac{\partial p}{\partial t} + p\frac{\partial v}{\partial y} + \frac{1}{x}\frac{\partial(p u x)}{\partial x} = 0}$

$u = 0$ für alle t und $x = 0$

$y = a = E - ct$

$0 = a_0 + a_1(E - ct) + a_2(E - ct)^2$

$= a_0 + a_1 E + a_2 E^2 - \cancel{(a_1 + 2a_2)ct}$

$- [a_1 + 2a_2 E]\, ct + a_2 c^2 t^2$

---

für $y = 0$ wird u ein relat. Maximum haben also

$\left.\frac{\partial u}{\partial y}\right|_{y=0} = 0$ und für $\begin{smallmatrix} y=0 \\ x=R \end{smallmatrix}$ ein absolutes; dann muss

also auch $\left.\frac{\partial u}{\partial x}\right|_{\substack{x=R \\ y=0}} = 0$ sein also: $\left.\frac{\partial a_0}{\partial x}\right|_{x=R} = 0$

aus Vndrängten [illegible]:

$$Ac\,x\,\mu = \int_0^a u\,dy + x\int_0^a \frac{\partial u}{\partial x}\,dy + A a x \frac{\partial \mu}{\partial t}$$

$$\cancel{Ac\,x\left[\mu_0 + 2a_2\mu(R-x)\right]} = a_0 a + a_1\frac{a^2}{2} + a_2\frac{a^3}{3}$$

$$Ac\,x\left[b_0 - 2\mu\int a_2\,dx\right]$$

$$+ x\left(\frac{\partial a_0}{\partial x}a + \frac{\partial a_1}{\partial x}\frac{a^2}{2} + \frac{\partial a_2}{\partial x}\frac{a^3}{3}\right)$$

$$+ \cancel{A a x\, 2\mu(R-x)\frac{\partial a_2}{\partial t}}$$

$$+ A a x\left[\frac{\partial b_0}{\partial t} - 2\mu\int\frac{\partial a_2}{\partial t}\,dx\right]$$

$$\frac{\partial \mu}{\partial t} + \mu\frac{\partial v}{\partial y} + \frac{1}{x}\frac{\partial(\mu u x)}{\partial x} = 0 \qquad \boxed{IV}$$

$$\frac{\partial}{\partial y} =$$

$$\cancel{\frac{\partial}{\partial t}\left(\frac{\partial \mu}{\partial y}\right)} + \cancel{\frac{\partial \mu}{\partial y}}\frac{\partial v}{\partial y} + \mu\frac{\partial^2 v}{\partial y^2} + \underbrace{\frac{1}{x}\frac{\partial}{\partial x}\left\{x\frac{\partial(\mu u)}{\partial y}\right\}}_{} = 0$$

$$\underbrace{\frac{\partial^2(\mu u)}{\partial x\,\partial y} + \frac{1}{x}\frac{\partial(\mu u)}{\partial y}}_{} = 0$$

$$\frac{\partial}{\partial x}\left\{u\cancel{\frac{\partial \mu}{\partial y}} + \mu\frac{\partial u}{\partial y}\right\} + \frac{1}{x}\left\{u\cancel{\frac{\partial \mu}{\partial y}} + \mu\frac{\partial u}{\partial y}\right\} = 0$$

$$\mu\frac{\partial^2 v}{\partial y^2} + \frac{\mu}{x}\frac{\partial u}{\partial y} + \underbrace{\frac{\partial}{\partial x}\left(\mu\frac{\partial u}{\partial y}\right)}_{} = 0$$

$$\underbrace{\frac{\partial \mu}{\partial x}\frac{\partial u}{\partial y} + \mu\frac{\partial^2 u}{\partial x\,\partial y}}_{\frac{1}{x}\frac{\partial}{\partial x}\left(x\mu\frac{\partial u}{\partial y}\right)}$$

$$\mu \frac{\partial^2 v}{\partial y^2} + \frac{1}{x}\frac{\partial}{\partial x}\left\{\mu x \frac{\partial u}{\partial y}\right\} = 0$$

$$\mu x \frac{\partial^2 v}{\partial y^2} + \frac{\partial}{\partial x}\left\{\mu x \frac{\partial u}{\partial y}\right\} = 0$$

$$\mu x \frac{\partial^2 v}{\partial y^2} + \mu \frac{\partial}{\partial x}\left\{x \frac{\partial u}{\partial y}\right\} \cancel{\mu} x \frac{\partial u}{\partial y}\frac{\partial^2 u}{\partial y^2} = 0$$

$$\underbrace{u + \mu x \frac{\partial^2 u}{\partial y \partial x}} + \mu \frac{\partial u}{\partial y} + x\frac{\partial \mu}{\partial x}\frac{\partial u}{\partial y} = 0$$

$$\mu x \frac{\partial}{\partial y}\left\{\frac{\partial v}{\partial y} + \frac{\partial u}{\partial x}\right\} + \frac{\partial u}{\partial y}\frac{\partial}{\partial x}(\mu x) = 0$$

$$\frac{\partial}{\partial y}\left\{\frac{\partial v}{\partial y} + \frac{\partial u}{\partial x}\right\} + \frac{\partial u}{\partial y}\frac{\partial \operatorname{log}(\mu x)}{\partial x} = 0$$

$$\frac{\partial}{\partial y}\left\{\frac{\partial v}{\partial y} + \frac{\partial u}{\partial x}\right\} + \frac{\partial}{\partial y}\left\{u \frac{\partial \operatorname{log}(\mu x)}{\partial x}\right\} = 0$$

$$\frac{\partial v}{\partial y} + \frac{\partial u}{\partial x} + u \frac{\partial \operatorname{log} \mu x}{\partial x} = \text{const}_y = f_c(x, t)$$

selbstverständlich! nach (■) $= \frac{1}{\mu}\frac{\partial \mu}{\partial t}$

$$\cancel{\frac{\partial^2 v}{\partial y^2} = 2c_2 + 2.3.y\, c_3}$$

$$\cancel{\mu x (2c_2 + 6 c_3 y) = -\frac{\partial}{\partial x}\left(\mu x \frac{\partial u}{\partial y}\right)}$$

$$\mu x \frac{\partial u}{\partial y}\frac{\partial^2 v}{\partial y^2} + \frac{\partial u}{\partial y}\frac{\partial}{\partial x}\left\{x \mu \frac{\partial u}{\partial y}\right) = 0$$

$$\frac{\partial^2 v}{\partial y^2} + \frac{\partial u}{\partial y}\frac{\partial}{\partial x}\left\{\operatorname{log}\left(\mu x \frac{\partial u}{\partial y}\right)\right\} = 0$$

$$a \int_{-\infty}^{+\infty} e^{-\gamma^2 x^2} dx = 1 = \frac{a}{\gamma} \int e^{-x^2} dx \sqrt{\gamma} = a\sqrt{\frac{\pi}{\gamma}} - 1$$

$$a = \sqrt{\frac{\gamma}{\pi}}$$

$$\sqrt{\frac{\gamma}{\pi}} \int_0^x e^{-\gamma x^2} dx = \frac{1}{\sqrt{\pi}} \int_0^{\gamma} e^{-\gamma^2} d\gamma$$

$$\frac{x}{l_{50}} = y$$

$$l_{50} \sqrt{\frac{\gamma}{\pi}} \int_0^{l_{50} \cdot y} e^{-\gamma y^2 l_{50}^2}$$

$$x = y \cdot l_{50}$$

$$y = 1$$

$$= 0.5$$

$$l_{50} \sqrt{\frac{\gamma}{\pi}} \int_0^{l_{50}} e^{-\gamma l_{50}^2 y^2} dy = \frac{1}{2}$$

$$y\, l_{50} = x$$

$$\int_0^1 e^{-\gamma x^2}$$

$$\sqrt{\frac{\gamma}{\pi}} \int_0^{\frac{l_{50}}{2}} e^{-\gamma x^2} dx = \frac{1}{4} = \frac{1}{\sqrt{\pi}} \int_0^{\sqrt{\gamma} \cdot \frac{l_{50}}{2}} e^{-y^2} dy$$

$$\gamma = f_4(l_{50})^2$$

$$\cancel{l_{50} = \frac{0.\ldots}{\sqrt{\gamma}}} \qquad \cancel{\gamma = \frac{0.\ldots}{l_{50}^2}}$$

$$\int_0^1 e^{-\xi^2}\, d\xi$$

$$\frac{x}{2-x} = y$$

$$x = \frac{2y}{1+y}$$

$$2\int_0^\infty e^{-\frac{2y}{1+y}} \, \frac{dy}{(1+y)^2}$$

$$\xi = \frac{\Sigma n x}{\Sigma n} = \frac{\int_0^\infty x\, e^{-h x^2}\, dx}{\int_0^\infty e^{-h x^2}\, dx} \qquad x\sqrt{h} = y$$

$$l_{50} = 2 \cdot \xi \cdot 0.845$$

$$= \frac{\int_0^\infty y\, e^{-y^2}\, dy}{\sqrt{h}\int_0^\infty e^{-y^2}\, dy}$$

$$= \frac{1}{2\sqrt{h}} \, \frac{e^{-y^2}\Big|_0^\infty}{\frac{1}{2}\sqrt{\pi}} = \frac{1}{\sqrt{\pi h}}$$

$$l_{50} = \frac{1.69}{\sqrt{\pi h}} \qquad \frac{1}{\sqrt{\pi}} = 0.56419$$

~~0.42… 1.22270 0.39… 0.30… 1.82820~~

$$\frac{0.6742}{\sqrt{h}} = l_{50}$$

$\frac{1}{2} = \frac{1}{\sqrt{\pi}} \int_0 e^{-y^2}$

$1 - y^2 \ldots$

$y - \frac{y^3}{3} + \frac{y^5}{12.5} - \frac{y^7}{6.7} \ldots$

0.65780 − 1

0.77170 − 2 0.0 … :3

0.28800 − 2 0.01 … :10

0.60320 − 3 0.004 … 6.7

0.71840 − 4 0.00023 … 6.4.9

0.45457
0.00194
0.45651
−0.03140
0.42511

0.03 …
0.000 …
0.03140

$\sqrt{\pi} = 1.77245$

$\frac{\sqrt{\pi}}{2} = 0.88621$

0.00110

0.3371

$\frac{\sqrt{\pi}}{4} =$

0.22789
−0.24857
0.02032

10

0.05350

$$l_{50} = \frac{0.05350}{\sqrt{\gamma}}$$

$$\gamma = \frac{0.00916}{l_{50}^2}$$

1	$\frac{15}{8}$	15
1	$\frac{13}{8}$	13
$\frac{5}{2}$	$\frac{11}{8}$	$27'5$
$\frac{9}{2}$	$\frac{9}{8}$	$40'5$
7	$\frac{7}{8}$	49
9	$\frac{5}{8}$	45
12	$\frac{3}{8}$	36
13	$\frac{1}{8}$	13
50		$239 : 8 = 30$

$\frac{}{5}$

[illegible] 0·47675

$\frac{\sqrt{\pi}}{4} = \int e^{-t^2} dt$ [illegible]

0·067830 - 1

0·1084   0·03420 - 4

0·0[illegible]63   0·[illegible]150 - 2

0·00558[illegible]   0·74810 - 7

0·47675
0·002[illegible]
—
0·478 31
−0·036
—
0·4439   = 0·4431   stimmt!

− 0·0361
[illegible]001
—
[illegible]

1 kg A 1 kg B = Molenlangen

n_1 n_2 = Zahl Atome

N_1 N_2 = Zahl Moleküle

$v_1 = \frac{n_1}{N_1}$ $v_2 = \frac{n_2}{N_2}$ = Zahl Atome in Molek.

a b = Atomgewicht

$a n_1 = \;\; = 1 = \;\; b n_2 = \;\; = 1$

c_1 c_2 = sp. W = W f. 1 kg 0 ∼ 1° Erw.

$a c_1 = b c_2$ (Dulong Petit)

$\frac{c_1}{n_1} = \frac{c_2}{n_2}$ (n = Atome)

$c_1 = J \frac{n_1 a \Delta(u_1^2)}{2} = J \frac{\Delta(u_1^2)}{2}$ $c_2 = J \frac{n_2 b \Delta(u_2^2)}{2} = J \frac{\Delta(u_2^2)}{2}$

$\frac{c_1}{n_1} = J \frac{a\Delta(u_1^2)}{2}$ $\frac{c_2}{n_2} = J \frac{b\Delta(u_2^2)}{2}$

… $\frac{a\Delta(u_1^2)}{2} = \frac{b\Delta(u_2^2)}{2}$

Besteht Gleichheit der Temp. darin, dass die mittl. kinetische Energie der Atome oder der Moleküle gleich ist?

Glaube des letzteren.

Dann ist Beweis in Riecke-? und Winkelmann falsch!

$v = \vartheta^{\ldots}$, gilt ~~Atom~~ Molecule

der Temp. Gleichheit:

$$\frac{A\Delta(v_1^2)}{2} = \frac{B\Delta(v_2^2)}{2}$$

$$A = \frac{n_1 a}{N_1} \qquad B = \frac{n_2 b}{N_2}$$

$$\frac{\overbrace{n_1 a}^{=1}\Delta(v_1^2)}{2N_1} = \frac{\overbrace{n_2 b}^{=1}\Delta(v_2^2)}{2N_2} \qquad \frac{\Delta(v_1^2)}{N_1} = \frac{\Delta(v_2^2)}{N_2}$$

$$c_1 = J\,\frac{N_1 \cdot A\Delta(v_1^2)}{2} \qquad c_2 = J\,\frac{N_2\, B\Delta(v_2^2)}{2}$$

Dulong Petit:

$$\frac{c_1}{n_1} = \frac{c_2}{n_2}$$

$$J\,\frac{\overbrace{N_1 A}^{=1}\Delta(v_1^2)}{2\, n_1} = J\,\frac{\overbrace{N_2 B}^{=1}\Delta(v_2^2)}{2 n_2} \qquad \frac{\Delta(v_1^2)}{n_1} = \frac{\Delta(v_2^2)}{n_2}$$

$$\frac{n_1}{N_1} = \frac{n_2}{N_2}$$

also würde bei genauer Giltigkeit des Dulong-Petit'schen Gesetzes folgen, dass die Molecüle (aller Körper bei derselben Temperatur) aus gleichviel Atomen zusammengesetzt sind! wenn man dabei die innere Arbeit = 0 voraussetzt!

$$a c_1 : b c_2 = a\,\Delta(v_1^2) : b\,\Delta(v_2^2)$$

$$= a N_1 \underbrace{\frac{\Delta(v_1^2)}{N_1}} : b N_2 \underbrace{\frac{\Delta(v_2^2)}{N_2}}$$

$$= a N_1 : b N_2$$

$$= \frac{N_1}{n_1} : \frac{N_2}{n_2} = \nu_1 : \nu_2$$

Also geben die Verhältnisse der Atomwärmen bei Voraussetzung einer inneren Arbeit $= 0$ zugleich die Verhältnisse der Zusammensetzung der Moleküle aus Atomen!

Dies alles bei Voraussetzung von gleichartigen Atomen

wenn wir jetzt voraussetzen

A	besteht aus	ν_1 Atomen mit Atomgew.	a_1
		ν_2 "	a_2
B		μ_1 "	b_1
		μ_2 "	b_2

so folgt ~~[illegible]~~

$$A = \nu_1 a_1 + \nu_2 a_2 \qquad B = \mu_1 b_1 + \mu_2 b_2$$

Temp. Gleichheit:

$$A\,\Delta(v_1^2) = B\,\Delta(v_2^2)$$

$$c_1 = J\,\frac{A N_1 \Delta(v_1^2)}{2} \qquad c_2 = J\,\frac{B N_2 \Delta(v_2^2)}{2}$$

$$= \frac{J}{2}\,\Delta(v_1^2) \qquad = \frac{J}{2}\,\frac{\Delta(v_2^2)}{2}$$

so folgt: $\underline{A c_1 = B c_2}$ } = ~~überhaupt~~ ~~allgemeinster~~ ~~Ausdruck des Dulong' Petit'~~ und Neumann'schen ~~Gesetz~~

$$\cancel{(a_1 v_1 + a_2 v_2)\,c_1 = (b_1 \mu_1 + b_2 \mu_2)\,c_2}$$

~~Im Besten ist: $(a_1 v_1 + a_2 v_2)\,c_1 = a_1 c_2 (\ldots)$~~

$$\cancel{2\,B.: \quad (a_1 V_1 + a_2 V_2)\,C_3 = a_1 \mu_1 c_1 = a_2 \mu_2 c_2}$$

$$\cancel{C_3 = \frac{a_1 \mu_1 c_1}{a_1 v_1 + a_2 v_2} = \frac{a_2 \mu_2 c_2}{a_1 v_1 + a_2 v_2}}$$

es würde also aus den Annahmen

1). Gleichheit der Temp. zweier Körper besteht darin, dass die kinetische Energie der Molecüle gleich ist

2). Innere Arbeit = 0 also spec. Wärme = Arbeit zur Vermehrung der kinetischen Energie der Molecüle

folgen, dass die Molecular-Wärme aller Körper gleich ist; dies nicht der Fall, also falsch!

Annahme 1 ist richtig denn n. Avogadro'scher Satz [illegible]

also Annahme 2 zu corrigieren

$$+ J N_1 \frac{A\Delta(v_1)^2}{2} P_1$$

$$c_1 = J\,\frac{N_1 A\,\Delta(v_1^2)}{2} + J\,N_1 \Delta(U_1)$$

$$c_2 = J\,\frac{N_2 B\,\Delta(v_2^2)}{2} + J\,N_2 \Delta(U_2)$$

ΔU_1 für 1 Molecül

$P_1 = $ [illegible]

pro 1 Molecül

Temperatur Gleichheit erfordert:

$$A\,\Delta(v_1^2) = B\,\Delta(v_2^2)$$

~~Dulong Petit: $a c_1 = b c_2$~~

$$A\,\Delta(v_1^2)\left(J N_1 + J N_1 P_1\right) = c_1$$

$$\frac{c_1}{N_1(1+P_1)} = \frac{c_2}{N_2(1+P_2)}$$

$$\frac{c_1}{N_1(1+P_1)} = \frac{c_2}{N_2(1+P_2)}$$

Dulong Petit: $a c_1 = b c_2$

~~$a : N_1(1+N_1P_1) = b$~~ :

$$a N_1(1+P_1) = b N_2(1+P_2)$$

$$\frac{1+P_1}{V_1} = \frac{1+P_2}{V_2}$$

~~[illegible] vorausgesetzt [illegible]~~

~~$\frac{1+(\frac{B}{B_1})}{V_1} = \frac{1+\frac{B}{B_2}}{V_2}$~~

also bei gegebener [illegible] des [illegible] [illegible] folgt nicht dass die innere Arbeit = 0 ist
(Winkelmann; Wüllner etc.) !

sondern, aus je mehr Atomen ein Molekül zusammengesetzt ist, desto grösser ist das Verhältnis der inneren Arbeit eines Moleküls zu den Zuwachse der L K desselben.

bei einatomigen Molekülen wäre innere Arbeit $V_1 = V_2 = 1$ proportional der L K (Absolutwert.)

wenn Index die Bedeutung = v

$$\frac{1+P_1}{1} = \frac{1+P_2}{2} = \frac{1+P_3}{3} = \frac{1+P_4}{4} = \frac{1+P_5}{5} \ldots$$

bei Körpern, deren Moleküle aus gleichviel Atomen zusammengesetzt sind, ist das Verhältnis der inneren Arbeit eines Moleküls zu dem Zuwachse der L K desselben gleich (mit N multipliziert)

oder mit anderen Worten:

$$P_1 = \frac{2 U_1}{A\, V_1^2}$$

$$\frac{U_1}{A\,(v_1)^2} = \frac{U_2}{B\,(v_2)^2}$$ oder weil Nenner gleich

$U_1 = U_2$ das heisst:

bei genauer Gültigkeit d. D P Gesetzes

müsste bei Körpern deren Molecül aus gleichviel Atomen

bestehen, die innere Arbeit pro Molecül bezogen bei Temperatur-

erhöhung gleich sein, also gesammte innere Arbeit

proportional der Anzahl Molecüle resp. verkehrt prop.

dem ~~Ato~~ Moleculargewicht.

---

bei verschieden atomigen Körpern:

je mehratomig desto grösser die innere Arbeit (während k=1)

pro Molecül (aber nicht proportional)

• (dies stimmt insofern als desto grösser Molecularwärme je mehr der Körper zusammengesetzt ist)

---

wenn P sehr gross ~~ist~~ wäre so dass der erste Posten zu

vernachlässigen so würde folgen:

$$\frac{a\,C_1}{b\,c_2} = \frac{a N_1 P_1}{b N_2 P_2} =$$

$$C_1 = J N_1 A \frac{\Delta(v_1^2)}{2} P_1$$

$$A\,\Delta(v_1^2) = B\,\Delta(v_2^2) \quad \text{also}$$

$$\frac{C_1}{N_1 P_1} = \frac{C_2}{N_2 P_2} \qquad \frac{P_1}{V_1} = \frac{P_2}{V_2}$$

A

pro Molecül

innere Arbeit proportional der Anzahl d. Atome pro Molec.

also gesammte innere Arbeit proportional der Gesammtzahl

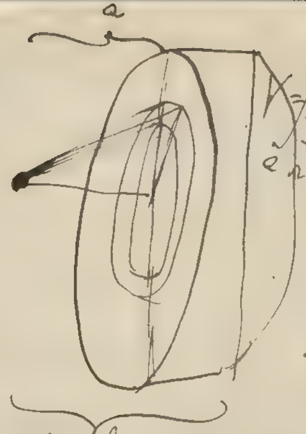
der Atome also verkehrt proportional dem

Atomgewicht

weil [illegible] aber spec. Wärme = Äquiv. nur für die innere

Wie ist [illegible] bei [illegible] ~~festen~~ Körpern

[illegible] ?



$$V = \int_a^b \int_{r=0}^{R} \mu \frac{2\pi r\, dr\, dx}{\left(r^2+x^2\right)^{\frac{n}{2}}}$$

$$\cancel{V = \mu\pi \sqrt{r^2+x^2}}$$

$$\cancel{V = \mu\pi \frac{\qquad}{\left(r^2+x^2\right)^{\frac{n}{2}+1}}}$$

$$V = \int_a^b \mu\pi \left. \frac{\left(r^2+x^2\right)^{1-\frac{n}{2}}}{1-\frac{n}{2}} \right|_0^R dx =$$

$$= \frac{2\mu\pi}{2-n} \int_a^b \left\{ \frac{R^2+x^2}{\left(R^2+x^2\right)^{\frac{n}{2}}} - x^{2-n} \right\} dx$$

$$\int \frac{R^2+x^2}{\left(R^2+x^2\right)^{\frac{n}{2}}} dx = \left(R^2+x^2\right)^{1-\frac{n}{2}} x - \int \frac{x\left(1-\frac{n}{2}\right) 2x\, dx}{\left(R^2+x^2\right)^{\frac{n}{2}}}$$

$$R^2 \underbrace{\int \frac{dx}{\left(R^2+x^2\right)^{\frac{n}{2}}}}_{J_1} + \underbrace{\int \frac{x^2 dx}{\cdots}}_{J_2} = \left(R^2+x^2\right)^{\frac{2-n}{2}} x - (2-n) \int \frac{x^2 dx}{\cdots}$$

$$J_1 = \frac{\left(R^2+x^2\right)^{\frac{2-n}{2}} x}{R^2} - \frac{(3-n)}{R^2} J_2$$

$$\int \frac{dx}{(R^2+x^2)^{\frac{n}{2}}} = \frac{x}{(R^2+x^2)^{\frac{n}{2}}} + n\int \frac{x^2\,dx}{(R^2+x^2)^{\frac{n}{2}+1}}$$

$$-n\int \frac{dx}{\dots} = -\int \frac{n\,dx}{(R^2+x^2)^{\frac{n}{2}}}$$

$$(1-n)\,J_1 = \frac{x}{(R^2+x^2)^{\frac{n}{2}}} + n\int \frac{dx}{(R^2+x^2)^{\frac{n}{2}}}\ \cancel{\frac{x^2}{R^2+x^2}} - R^2 \cancel{\dots}$$

$$= \frac{x}{(R^2+x^2)^{\frac{n}{2}}} - nR^2 \int \frac{dx}{(R^2+x^2)^{\frac{n}{2}+1}}$$

$n = m-2$

$$(1-\cancel{m}+2)\underbrace{\int \frac{dx}{(R^2+x^2)^{\frac{n-2}{2}}}}_{J} = \frac{x}{(R^2+x^2)^{\frac{n-2}{2}}} - (n-2)R^2 \underbrace{\int \frac{dx}{(R^2+x^2)^{\frac{n}{2}}}}_{J_1}$$

$$J = R^2 J_1 + J_2 = (R^2+x^2)^{\frac{2-n}{2}}x - (3-n)J_2$$

$$(3-n)J = \frac{x}{(R^2+x^2)^{\frac{n-2}{2}}} - (n-2)R^2 J_1$$

$$J = \frac{x}{(R^2+x^2)^{\frac{n-2}{2}}} - (n-2)(R^2+x^2)^{\frac{2-n}{2}}x - (n-2)(3-n)J_2$$

$$(3-n)^2 J_2 = (R^2+x^2)^{\frac{2-n}{2}}x\,(n-4) + \cancel{x(R^2+x^2)^{\frac{2-n}{2}}}$$

$$J_2 = \qquad x(R^2+x^2)^{\frac{2-n}{2}}$$

$$\frac{dJ_2}{dx} = (R^2+x^2)^{\frac{2-n}{2}} + (2-n)x^2(R^2+x^2)^{-\frac{n}{2}}$$

$$= (R^2+x^2)^{-\frac{n}{2}}\left[R^2 + (3-n)x^2\right]$$

Voraussetzung $n > 2$

$$V_1 \qquad V_2$$

$$a V_1 v_1^2 = b V_2 v_2^2$$

$$a u_1^2 = b u_2^2$$

$$\cancel{c = \frac{J}{\Delta}\left(a\frac{v_1^2}{\ldots} + a u_1^2\right)}$$

$$\cancel{J\, a V_1 v_1^2 (1+\lambda)}$$

$$\frac{u_1^2}{V_1 v_1^2} = \frac{u_2^2}{V_2 v_2^2} = \lambda = 1 \quad \text{v. d. 1atomige } n$$

$$u_1^2 = \lambda V_1 v_1^2$$

$$c_1 = J N_1 \Delta(a V_1 v_1^2) + J N_1 V_1 \Delta(a u_1^2)$$

$$= J N_1 \Delta(a V_1 v_1^2)\left[1 + \lambda V_1\right] = J N_1 \Delta(a V_1 v_1^2)(1+V_1)$$

ϱ / :

$$\frac{c_1}{N_1(1+V_1)} = \frac{c_2}{N_2(1+V_2)} \qquad \text{v. } P_1 = V_1$$

$$\frac{1+V_1}{V_1} = \frac{1+V_2}{V_2} \quad \text{die d. O. S. } \times \ldots V \ldots$$

en / e, 1atomige ... spec. Vol. ... n

I). $\xrightarrow{\quad V \quad} \overset{M}{\circ}$

II). $\xrightarrow{\quad V \quad} \circ \cdot \underset{v}{\circ}$ $\quad m = \frac{M}{2}$

$$E_I = M\frac{V^2}{2}$$

$$E_{II} = \frac{m}{2}\left[(V+v)^2 + (V-v)^2\right]$$

$$= \frac{M}{2}\left[V^2 + v^2\right] = E_I + 2\cdot\frac{m v^2}{2}$$

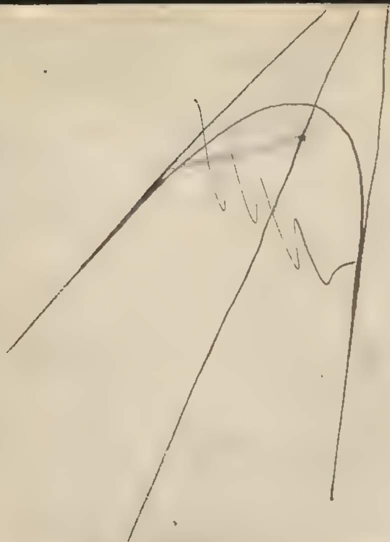
$$E_n = \frac{m}{2}\sum\left[(V \pm v_2)\right]^2 \qquad \cancel{\sum(V \pm v) = V n}$$

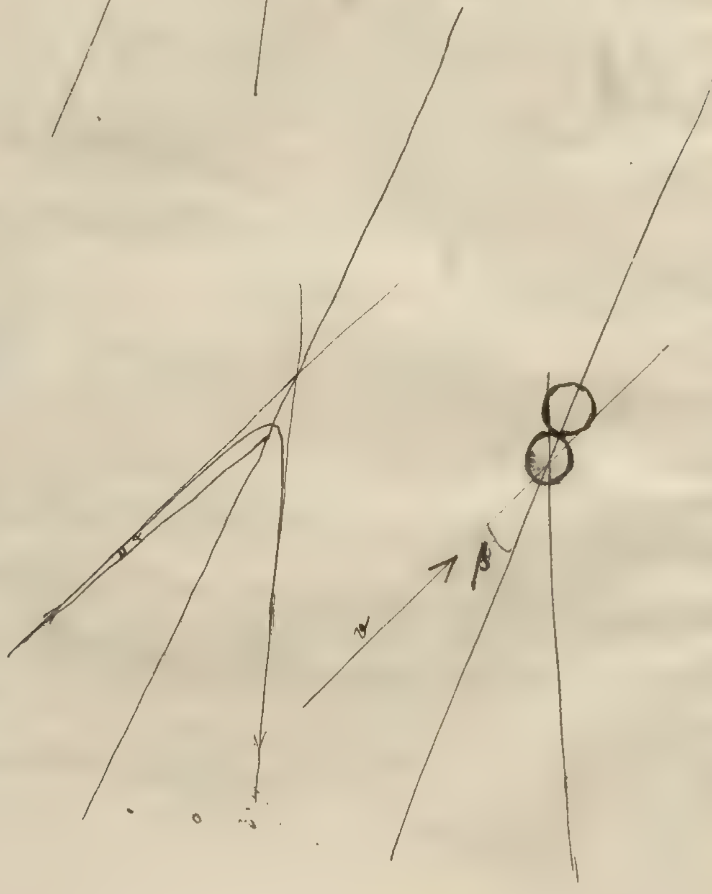
$$= \frac{m}{2}\left(\sum V^2 + \sum v_2^2\right) \quad \sum v_2 = 0 \text{ sabo } \frac{m}{2}$$

$$E_n = E_1 + n\frac{m v^2}{2} = E_1\left[1 + \left(\frac{v}{V}\right)^2\right]$$

$$M = n\,m$$

Gesammte)
das (Bewegungs Energie eines Molecul, dessen Atome
Schwingungen (Bewegungen) um den Schwerpunkt desselben ausführen
= Bewegungs Energie des Schwerpunktes des Molecul + Σ B. E. der Atome um den Schwerpunkt
= " " " " " $\left[1 + (\text{Verhältnis der Geschw.})^2\right]$

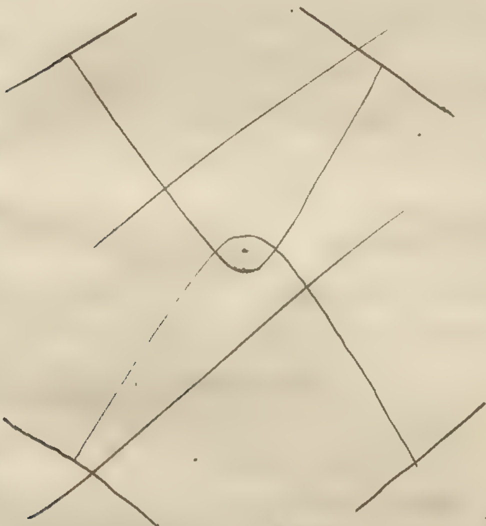




$\beta = \varphi_0 - \alpha$

das, was als Red. der Arbeit bezeichnet wird, ist theilweise die Verkürzung des Weges in Folge der grössten Geschwindigkeit im Perihel, theils Wirkung der Deviation.

M.



$\parallel C: v_0, r_0, \alpha$

$\cancel{c = r^2 \frac{d\varphi}{dt}}$

bei quadrat. Gesetz!

$$C = \frac{v_0^2}{2} - \frac{\mu}{r_0}$$

$$r = \frac{\frac{c^2}{\mu}}{1 + \sqrt{1 + \frac{2c^2C}{\mu^2}}\cos\varphi}$$

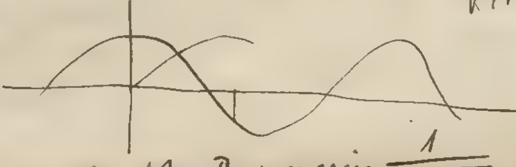
$$\mu = k(m + m_1)$$

$$\cos\varphi\sqrt{1 + \frac{2c^2C}{\mu^2}} = -1$$

$$c = \frac{1}{2} r_0 v_0 \sin\alpha$$

$$\varphi_0 = \arccos\frac{-1}{\sqrt{1 + \frac{2c^2C}{\mu^2}}}$$

$r = \infty$



$$\varphi_0 = \frac{\pi}{2} + \arcsin\frac{1}{\sqrt{1 + \frac{2c^2C}{\mu^2}}}$$

$$r = \frac{p}{1+\varepsilon\cos\varphi}$$

$$\frac{\frac{c^4}{\mu^2}}{\left(1+\sqrt{1+\frac{2c^2C}{\mu}}\cos\varphi\right)^2}\,d\varphi = c\,dt$$

$$\int\frac{A}{(1+B\cos\varphi)^2}\,d\varphi = A\left\{\frac{1}{-\left(1-\sqrt{1+\frac{2c^2C}{\mu}}\right)\frac{2c^2C}{\mu}}\right\}$$

$$\left\{\frac{\left(1+\frac{2c^2C}{\mu}-\sqrt{1+\frac{2c^2C}{\mu}}\right)\sin\varphi}{1+\sqrt{1+\frac{2c^2C}{\mu}}\cos\varphi}+\underbrace{(1-\sqrt{\ })\int\frac{d\varphi}{1+\sqrt{\ }\cos\varphi}}\right\}$$

$$= -\frac{1}{(1-\sqrt{\ })\operatorname{tg}\frac{\varphi}{2}}$$

$$= A\left\{\frac{1}{\frac{2c^2C}{\mu}\left(\sqrt{\ }-1\right)}\right\}\left\{\left(1+\frac{2c^2C}{\mu}-\sqrt{\ }\right)\sin\varphi\right.$$

Perihel distanz $r(\text{Min}) =$ $\varphi = 0$

$$r = \frac{\frac{c^2}{\mu}}{1+\sqrt{1+\frac{2c^2C}{\mu}}}$$

$$2\left(\frac{r_0 \sin\varphi_0 - r\sin\varphi}{\sin\beta \quad v_0} - \int_{r_0}^{r}\right) = \ldots$$

$\lim_{r_0=\infty}$

$$\sin\beta = \cos\arcsin\frac{1}{\sqrt{}} = \sqrt{1-\sin^2\arcsin}$$

$$= \sqrt{1-\frac{1}{1+\frac{2c^2C}{\mu^2}}} = \frac{\frac{2c^2C}{\mu^2}}{\sqrt{1+\frac{2c^2C}{\mu^2}}}$$

$$r\,(1+\sqrt{}\,\cos\varphi) = \frac{c^2}{\mu}$$

$$\cos\varphi = \frac{\frac{c^2}{\mu}-r}{r\sqrt{}}$$

$$\sin\varphi = \sqrt{1-\frac{\left(\frac{c^2}{\mu}-r\right)^2}{r^2\left(1-\frac{2c^2C}{\mu^2}\right)}} = \frac{\sqrt{2\frac{c^2r}{\mu}-\frac{c^4}{\mu^2}-\frac{2c^2Cr^2}{\mu^2}}}{r\sqrt{}}$$

$$= \frac{\sqrt{\frac{c^2}{\mu}\left(2r-\frac{c^2}{\mu}-2Cr^2\right)}}{r\sqrt{}}$$

$$\operatorname{tg}\frac{\varphi}{2} = \sqrt{\frac{1-\cos\varphi}{1+\cos\varphi}} = \sqrt{\frac{r\sqrt{}-\frac{c^2}{\mu}+r}{r\sqrt{}+\frac{c^2}{\mu}-r}}$$

$$= \frac{\sqrt{1-\cos^2\varphi}}{1+\cos\varphi} = \frac{\sin\varphi}{1+\cos\varphi} \qquad \frac{1}{\operatorname{tg}\frac{\varphi}{2}} = \sqrt{\frac{1+\cos\varphi}{1-\cos\varphi}} = \frac{\sin\varphi}{1-\cos\varphi}$$

$$\left\{ \frac{\left(1+\frac{2c^2C}{\mu}+\sqrt{}\right)\sin\varphi}{1+\sqrt{}\cos\varphi} - \cancel{\frac{1+\cos\varphi}{\sin\varphi}}\frac{\sin\varphi}{1-\cos\varphi} \right\}$$

$$= \frac{\frac{2c^2C}{\mu})\sin\varphi+\sqrt{}\sin\varphi-(\quad)\sin\varphi\cos\varphi-2\sqrt{}\sin\varphi\cos\varphi - \cancel{\sin\alpha} - \cancel{\sin\alpha}}{(1+\sqrt{}\cos\varphi)(1-\cos\varphi)}$$

$$= \frac{\frac{2c^2C}{\mu}+\sqrt{1+\frac{2c^2C}{\mu}}-\left(1+\frac{2c^2C}{\mu}+2\sqrt{1+\frac{2c^2C}{\mu}}\right)\cos\varphi}{(1+\sqrt{}\cos\varphi)(1-\cos\varphi)}$$

$$\sin\varphi_0 = \sin(\beta+\alpha)$$

$$= \sin\beta\cos\alpha+\cos\beta\sin\alpha$$

$$= \cos\alpha\frac{\frac{2c^2C}{\mu^2}}{\sqrt{}} - \sin\alpha\frac{1}{\sqrt{}}$$

$$\sin\varphi_0 = \frac{\frac{2c^2C}{\mu^2}\cos\alpha-\sin\alpha}{\sqrt{1+\frac{2c^2C}{\mu^2}}}$$

$$= \frac{\frac{C}{\mu^2}\frac{1}{2}r_0^2v_0^2\sin^2\alpha\cos\alpha-\sin\alpha}{\sqrt{}}$$

$$= \frac{\sin\alpha}{\sqrt{}}\left(\frac{C}{4\mu^2}r_0^2v_0^2\sin 2\alpha-1\right)$$

$$\cos\varphi_0 = \sqrt{\frac{1 + \frac{2c^2C}{\mu^2} - \frac{4c^4C^2}{\mu^4}\cos^2\alpha + \frac{4c^2C}{\mu^2}\cos\alpha\sin\alpha - \sin^2\alpha}{1 + \frac{2c^2C}{\mu^2}}}$$

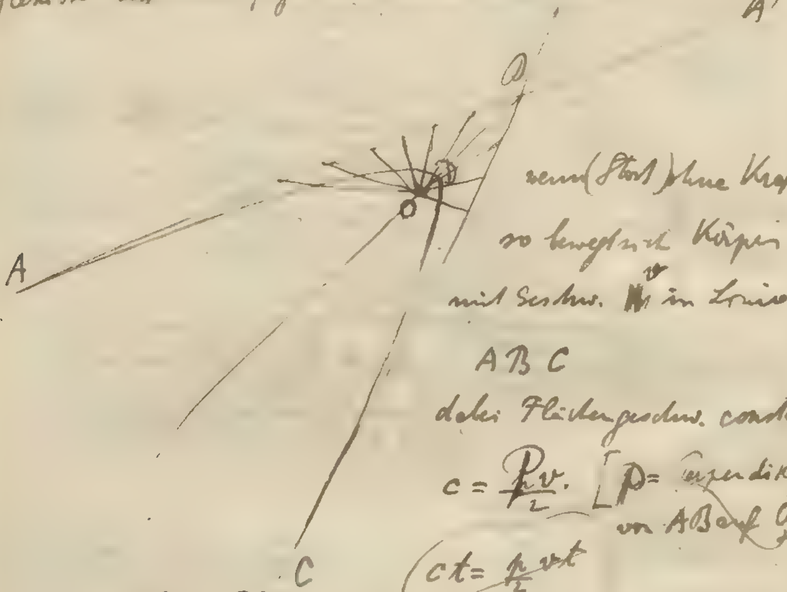
$$= 1 + \frac{2c^2C}{\mu^2} - \frac{4c^4C^2}{\mu^4} + \frac{4c^4C^2}{\mu^4}\sin^2\alpha - \sin^2\alpha + \frac{4c^2C}{\mu^2}\cos\alpha\sin\alpha$$

$$= \sqrt{\left(1 - \frac{4c^4C^2}{\mu^4}\right)\left(1 - \sin^2\alpha\right) + \frac{2c^2C}{\mu^2}\left(1 + 2\sin\alpha\cos\alpha\right)}$$

$$\sin\varphi_0 \Big) \cos\varphi_0 = \sqrt{\frac{\left(1 - \frac{4c^4C^2}{\mu^4}\right)\cos^2\alpha + \frac{2c^2C}{\mu^2}\left(1 + \sin 2\alpha\right)}{1 + \frac{2c^2C}{\mu^2}}}$$

$$= \sqrt{\left(1 - \frac{2c^2C}{\mu^2}\right)\cos^2\alpha + \frac{\frac{2c^2C}{\mu^2}\left(1 + \sin 2\alpha\right)}{1 + \frac{2c^2C}{\mu^2}}}$$

Die Bestimmung durch die $\frac{1}{r^2}$-Kraft gegenüber einer Stoß-Reflexion lässt sich folgendermaßen berechnen:



wenn (Stoß) ohne Kraft so bewegt sich Körper mit Geschw. v in Linie

ABC

dabei Flächengeschw. constant

$c = \frac{p v}{2}$. [p = Perpendikel von AB auf O]

$c t = \frac{p}{2} v t$

$F = \frac{p}{2} s$

also Zeit = $\frac{\text{Sector Fläche}}{\text{Flächengeschw.}}$

dagegen bei Centralbewegung zwar dieselbe Flächengeschwindigkeit, aber es entfällt die Fläche zwischen Asympt. und Hyperbel.

also Zeitgewinn = $\frac{\text{Fläche } ABCD}{\text{Flächengeschw.}}$

$$\rho = \frac{p}{1+\varepsilon\cos\varphi}$$

$$\frac{F}{2} = \int \frac{\rho^2 d\varphi}{} = \frac{p}{2}\int_0^{\varphi_0} \frac{d\varphi}{(1+\varepsilon\cos\varphi)^2}$$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

$$y = \frac{b}{a}\sqrt{x^2 - a^2}$$

$$\int y\,dx = \frac{b}{a}\int\sqrt{x^2-a^2}\,dx$$

$$= \mathcal{J}$$

$$\mathcal{J} = x\sqrt{x^2-a^2} - \int\frac{x^2}{\sqrt{x^2-a^2}}\,dx$$

$$= \mathcal{J} + \int\frac{a^2\,dx}{\sqrt{x^2-a^2}}$$

$$2\mathcal{J} = x\sqrt{x^2-a^2} - a^2\int\frac{dx}{\sqrt{x^2-a^2}}$$

$$\mathcal{J} = \frac{x}{2}\sqrt{x^2-a^2} - \frac{a^2}{2}\log\left(x + \sqrt{x^2-a^2}\right)$$

$$\int y\,dx = b\frac{x}{2}\sqrt{\left(\frac{x}{a}\right)^2 - 1} - \frac{ab}{2}\log\left(\frac{x}{a} + \sqrt{\left(\frac{x}{a}\right)^2 - 1}\right)$$

$$= \frac{xy}{2} - \frac{ab}{2}\log\left(\frac{x}{a} + \frac{y}{b}\right)$$

die Fläche ABCD $= \frac{ab}{2}\log\left(\frac{x}{a} + \frac{y}{b}\right)\Big|_{x=0}^{x=\infty}$

$$= \frac{ab}{2} + \frac{ab}{2}\log\left(\frac{x}{a} + \frac{y}{b}\right)\Big|_{x=a}^{x=\infty} = \infty\,!!!$$

[illegible] wird also ∞; daher muss man als obere Grenze die ~~wirkliche Weglänge~~ Entfernung λ einführen

$$\frac{F(ABCD)}{2} = \frac{ab}{2}\left\{1 + \log\left(\frac{\lambda}{a} + \frac{y_\lambda}{b}\right)\right\} = \frac{ab}{2}\left\{1 + \log\frac{\lambda}{a} + \log\left(1 + \frac{a}{b}\frac{y_\lambda}{x_\lambda}\right)\right\}$$

$$= (\text{angenähert})\ \frac{ab}{2}\left\{1 + \log\frac{2\lambda}{a}\right\}$$

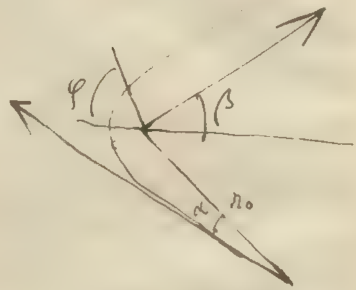
$\mathfrak{R}$ = Entfernung $\cdot \frac{a}{\sqrt{a^2+b^2}}$

$$c = \frac{r_0 v_0 \sin\alpha}{2}$$

$$C = \frac{v_0^2}{2} - \frac{\mu}{r_0}$$

$$\mu = k(m+m_1)$$

$$r = \frac{\frac{c^2}{\mu}}{1+\cos\varphi\sqrt{1+\frac{2c^2C}{\mu^2}}}$$



$$\beta = 180^\circ - \varphi_{As}$$

$$\varphi_{As} = 90^\circ + \arcsin\frac{1}{\sqrt{1+\frac{2c^2C}{\mu^2}}}$$

daraus: $\beta = \arccos\frac{1}{\sqrt{1+\frac{2c^2C}{\mu^2}}}$ $\qquad \cos\beta = \frac{1}{\varepsilon}$

$\cancel{\sqrt{a^2+b^2} = e =}$

$$(r)_{\varphi=0} = \cancel{\sqrt{a^2+b^2} - a} = \frac{\frac{c^2}{\mu}}{1+\sqrt{1+\frac{2c^2C}{\mu}}} = a\left[\sqrt{1+\left(\frac{b}{a}\right)^2}-1\right]$$

$$\frac{b}{a} = \operatorname{tg}\beta = \operatorname{tg}\arccos\frac{1}{\sqrt{}} = \frac{\sqrt{1-\frac{1}{1+\frac{2c^2C}{\mu^2}}}}{\frac{1}{\sqrt{1+\frac{2c^2C}{\mu^2}}}} = \sqrt{\frac{2c^2C}{\mu^2}}$$

$$= \sqrt{\frac{1+\frac{2c^2C}{\mu^2}-1}{1+\cdots}} = \cancel{\sqrt{\frac{\frac{2c^2C}{\mu^2}}{1+\frac{2c^2C}{\mu^2}}}} \cancel{\frac{1}{1+\frac{\mu^2}{2c^2C}}}$$

$$\frac{\frac{c^2}{\mu}}{1+\sqrt{1+\frac{2c^2C}{\mu^2}}} = a\left[\sqrt{1+\frac{2c^2C}{\mu^2}} - 1\right] \qquad \frac{c^2}{\mu} = \frac{2c^2C}{\mu^2}a$$

$$a = \frac{\mu}{2C}$$

$$\frac{c^2}{\mu} = a\left\{\sqrt{1+\frac{2c^2C}{\mu^2}} \ldots\right\}$$

oder auch auf folgende Weise:

$$a : r_0 = \sin\alpha : \sin\beta$$

$$a = \lim_{r_0=\infty} \frac{r_0 \sin\alpha}{\sin\beta}$$

$$\sin\beta = \sqrt{\frac{2c^2C}{1+\frac{2c^2C}{\mu^2}}}$$

$$\frac{1}{\sin\beta} = \sqrt{\frac{1+\frac{2c^2C}{\mu^2}}{2c^2C}} = \frac{1}{\mu}\sqrt{1+\frac{1}{2c^2C}} = \frac{1}{\mu}\left[1+\frac{1}{c^2C}+\cdots\right]$$

?

$$a = \lim \frac{r_0 \sin\alpha}{\mu}\left(1+\frac{1}{c^2C}\right) \qquad \frac{\mu}{v_0}$$

$$\lim = 0$$

$$= \frac{2c}{v_0\mu}$$

$$a = \frac{\mu}{2C}$$

$$\sqrt{a^2+b^2} = \sqrt{\frac{\mu^2}{4C^2}+\frac{c^2}{2C}} = \frac{\sqrt{\mu^2+2c^2C}}{2C} \qquad b = \sqrt{\frac{c^2}{2C}}$$

$$= \frac{c}{\sqrt{2C}}$$

$$= \frac{\mu}{2C}\sqrt{1+\frac{2c^2C}{\mu^2}}$$

$$\frac{\sqrt{a^2+b^2}}{a} = \varepsilon = \sqrt{1+\frac{2c^2C}{\mu^2}}$$ stimmt!

$$\Delta T = \frac{F}{c} = \frac{ab}{c}\left\{1 + \log\frac{2l}{a}\right\}$$

$$= \frac{\mu}{\sqrt{(2C)^3}}\left\{1 + \log 2\right.$$

l = Entfernung des Punktes vom ~~Focus = Entfernung vom gemeinsamen Schwerpunkt = doppelte Entfernung der beiden M.~~ Mittelpunkt $\cdot \frac{a}{\sqrt{a^2+b^2}}$

(angenähert)

$$l = \left\{\sqrt{a^2+b^2} + \underbrace{\text{Entfernung vom Focus} \atop \text{" Schwerpunkt}}_{\text{halbe Entfernung der beiden P. voneinander "}\lambda}\right\}\frac{a}{\sqrt{a^2+b^2}}$$

$$= a + \frac{a\lambda}{2\sqrt{a^2+b^2}} = a\left\{1 + \frac{\lambda}{2\sqrt{a^2+b^2}}\right\}$$

$$= a\left\{1 + \frac{\lambda}{\frac{\mu}{C}\sqrt{1+\frac{2a^2C}{\mu^2}}}\right\}$$

$$\Delta T = \frac{\mu}{\sqrt{(2C)^3}}\left\{1 + \log 2\left\{1 + \frac{\lambda}{\frac{\mu}{C}\sqrt{1+\frac{2a^2C}{\mu^2}}}\right\}\right\}$$

Drucke $\frac{\lambda}{\ldots}$ ist = $\frac{\text{Entfernung der beiden F.}}{\text{Excentr. der Bahn}}$ das sehr gross

daher transform

$$\frac{\Delta T}{T} = \frac{\mu}{(2C)^{\frac{3}{2}}}\left\{1 + \log 2 + \log\frac{\lambda}{\frac{\mu}{C}\sqrt{1+\frac{2c^2C}{\mu^2}}} + \log\left\{1+\frac{\frac{\mu}{C}\sqrt{}}{\lambda}\right\}\right\}$$

$$= \frac{\mu}{(2C)^{\frac{3}{2}}}\left\{1+\log\frac{2\lambda}{\frac{\mu}{C}\sqrt{1+\frac{2c^2C}{\mu^2}}} + \underbrace{\log(1+\delta)}_{\neq 0}\right\}$$

$$\longrightarrow \quad \lambda = 2r_0$$

$$\Delta T = \frac{\mu}{(2C)^{\frac{3}{2}}}\left\{1+\log\frac{4r_0C}{\frac{\mu}{C}\,\varepsilon}\right\}$$

$$\varepsilon = \sqrt{1+\frac{2c^2C}{\mu^2}} = \sqrt{1+\frac{\cancel{4}\,r_0^2v_0^2\sin^2\alpha}{2\,\cancel{4}\,\mu^2}\left(\frac{v_0^2}{2}-\frac{\mu}{r_0}\right)}$$

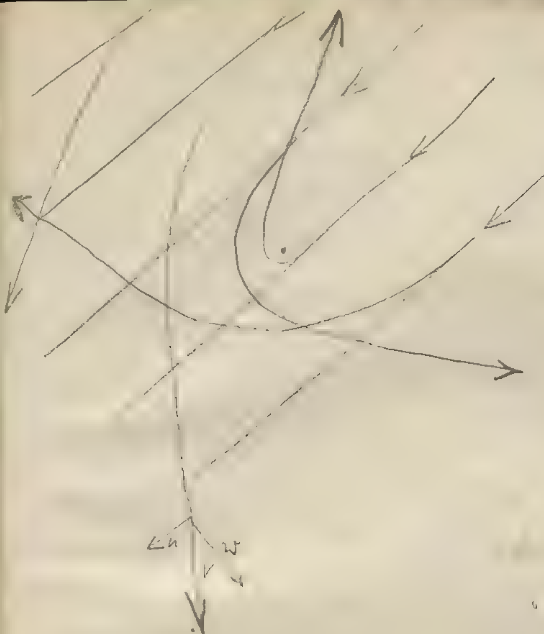
$\mu = 2km$

$$\varepsilon = \sqrt{1+\frac{r_0^2v_0^2\sin^2\alpha}{8k^2m^2}\left(\frac{v_0^2}{2}-\frac{2km}{r_0}\right)}$$

wenn man die senkrechte Entfernung des Focus von der Asymptote einführt $s = r_0\sin\alpha$

$$c = \frac{v_0 s}{2}$$

$$\varepsilon = \sqrt{1+\frac{v_0^2s^2}{2\mu^2}\left(\frac{v_0^2}{2}-\frac{\mu}{r_0}\right)}$$



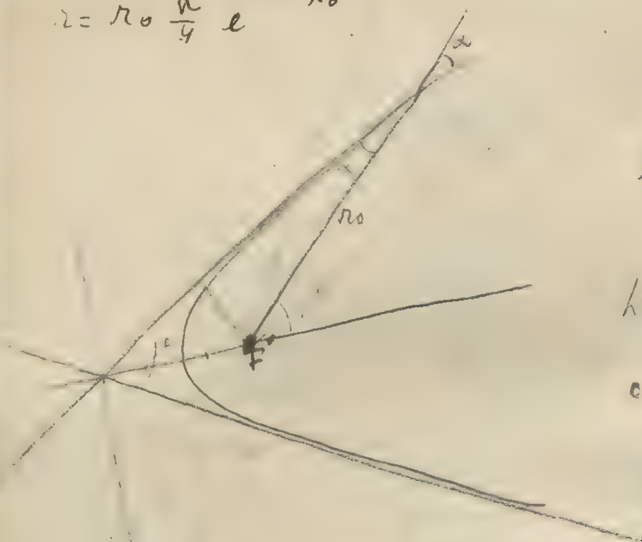
$u = V \sin 2\varphi$

R

R

$: 2n \cdot V$

$r = r_0 \frac{\alpha}{4} e^{-\frac{2a\mu}{r_0}}$



$a = \frac{\mu}{\kappa}$

$b = \frac{c}{\sqrt{\kappa}}$

$h = v_0^2 - \frac{2}{r_0}$

$c = r_0 v_0 \sin\alpha$

[illegible]

[illegible]

$r = \frac{c}{v_0}$ $c = $ [illegible]

$=$

$n = \sqrt{2 \cdot \ldots} = \sqrt{\ldots 2(1-x)}$

$= \sqrt{\ldots}$ [illegible] $\sin\alpha)$

[illegible] $= v_0^2 \ldots v_0 = \frac{v_0^2 r}{\mu}$

[illegible]

$n = \sqrt{2 \frac{\ldots}{\ldots}} = \sqrt{\frac{2 v_0^2 r \mu}{\ldots v_0^2 \mu^2}}$

$$= \frac{\pi}{4}\int_{-\infty}^{+\infty} \frac{r_0 \sqrt{\frac{a}{\pi}}\, e^{-a v^2}}{\sqrt{1 - \frac{2\mu}{r_0 v^2}}}\, dv$$

$$= \frac{\pi}{4} r_0 \sqrt{\frac{a}{2}} \int_{-\infty}^{+\infty} \frac{v\, e^{-a v^2}\, dv}{\sqrt{v^2 - \frac{2\mu}{r_0}}}$$

$$= 2\int_{c}^{+\infty} \frac{x\, e^{-x^2}\, dx}{\sqrt{x^2 - c}} = \cancel{-\frac{1}{2}\frac{e^{-x^2}}{\sqrt{x^2-a}}\Big|_0^{\infty} - \frac{1}{2}\int \frac{e^{-x^2}\, x\, dx}{\sqrt{(x^2-a)^3}}}$$

$x^2 = 2$

$x^2 - c = y^2$

$$\int_0^{\infty} \frac{e^{-a-y^2}}{y}\, y\, dy = e^{-a}\int_0^{\infty} e^{-y^2} dy = e^{-c}\frac{\sqrt{\pi}}{2}$$

$$= \int_a^{\infty} \frac{e^{-z}\, dz}{\sqrt{z-a}} = \cancel{\frac{e^{-z}}{\sqrt{z-a}}\Big|_a^{\infty} - \frac{1}{2}\int_a^{\infty} \frac{e^{-z}}{(z-a)^{\frac{3}{2}}}\, dz}$$

partiell

$$J = \int_b^{\infty} \frac{e^{-z}\, dz}{\sqrt{z-b}}$$

$$\frac{\partial J}{\partial b} = \frac{1}{2}\int_a^{\infty} \frac{e^{-z}\, dz}{(z-b)^{\frac{3}{2}}} = \frac{e^{-z}}{\sqrt{z-b}}\Big|_a^{\infty} - \frac{\partial J}{\partial b}$$

$$J + \frac{\partial J}{\partial b} = \frac{e^{-a}}{\sqrt{a-b}}$$

$$J = e^{-x}\left[C - \int \frac{e^{-a}}{\sqrt{a-x}}\, e^{x}\, dx\right]$$

$$= e^{-x}\left[C - e^{x} J\right]$$

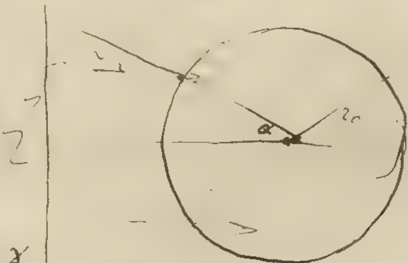
$\frac{2\mu a}{r_0} = c$

$$= \frac{\sqrt{\pi a}}{4} r_0 \cdot 2 \cdot \int_c^{\infty} \frac{e^{-a v^2}\, d(a v^2)}{\sqrt{a}\sqrt{a v^2 - \frac{2\mu a}{r_0}}} = \frac{\sqrt{\pi}}{2} r_0 \int_c^{\infty} = \frac{\sqrt{\pi}}{2} \cdot r_0 \frac{\sqrt{\pi}}{2} e^{-\frac{2a\mu}{r_0}}$$

$$= \frac{\pi}{4} r_0\, e^{-\frac{2a\mu}{r_0}}$$

$$r = \frac{r_0 v_0 \sin\alpha}{\sqrt{v_0^2 - \frac{2\mu}{r_0}}}$$

10. [illegible]



$$(r) = \frac{1}{4\pi}\int_0^\pi r\, 2\pi \sin\alpha\, d\alpha$$

$$= \frac{1}{2}\int_0^\pi \frac{r_0 v_0}{\sqrt{}} \sin^2\alpha\, d\alpha$$

$$= \frac{\pi}{4}\,\frac{r_0 v_0}{\sqrt{v_0^2 - \frac{2\mu}{r_0}}}$$

$$\int_0^\pi \sin^2\alpha\, d\alpha = \int \frac{1-\cos 2\alpha}{2}\, d\alpha = \int_0^{2\alpha} \frac{(1-\cos\alpha)\, d\alpha}{4} = \frac{\pi}{2}$$

$$N = \sqrt{\frac{a}{\pi}}\, e^{-a v^2}\, dv$$

$$\frac{3}{2a} = (c^2) = \frac{3\,p}{s}$$

$$a = \frac{s}{2p}$$

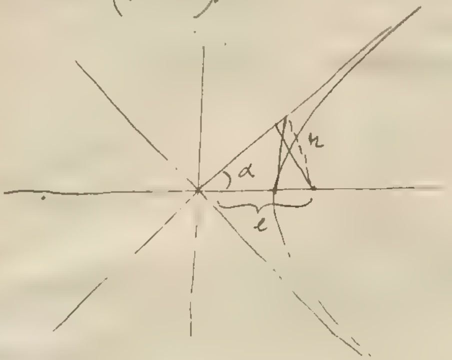
$$((r)) = \int_{-\infty}^{\infty} (r)\, N\, dv$$

$$= \frac{\pi}{4}\int \frac{r_0}{\sqrt{1 - \frac{2\mu}{r_0 v_0^2}}}\, N\, dv =$$

$$\cancel{= \frac{\pi}{4}\int r_0 \sqrt{\frac{a}{\pi}}}$$

Zur kinetischen Gastheorie.

Mittlere (Perihelabstand bei Annahme des Sharl. Sectors



$a^2 + b^2 = e^2$

$r = e \sin\alpha$

$\operatorname{tg}\alpha = \frac{b}{a}$

$\sin\alpha = \frac{\operatorname{tg}\alpha}{\sqrt{1+\operatorname{tg}^2\alpha}} = \frac{b}{\sqrt{a^2+b^2}}$

$r = b$ (selbstverständlich!)

$\left\{\begin{array}{l} h = v_0^2 - \frac{2\mu}{r_0} \\ c = r_0 v_0 \sin\alpha \end{array}\right.$

$\mu^2 y^2 - h c^2 x'^2 + 2 c^2 x' \sqrt{\mu^2 + h c^2} = c^4$

$a^2 y^2 - b^2 x'^2 \qquad = \quad$

$x' = x + m$

$\mu^2 y^2 - h c^2 x^2 + 2 c^2 x \sqrt{\mu^2 + h c^2} - 2 m h c^2 x = h c^2 m^2 +$

$+ c^4 - 2 c^2 m \sqrt{\mu^2 + h c^2}$

$= \underbrace{\frac{c^2(\mu^2 + h c^2)}{h}}\ + c^4 -$

$- \frac{2c^2}{h}(\mu^2 + h c^2)$

$= \cancel{c^2(\mu^2 + h c^2)\left(1 - \frac{2}{h}\right)} + c^4$

$= c^4 - \frac{c^2(\mu^2 + h c^2)}{h}$

$= - \frac{c^2 \mu^2}{h}$

$\sqrt{\mu^2 + h c^2} = m h$

$m = \frac{\sqrt{\mu^2 + h c^2}}{h}$

$x^2 \frac{h^2}{\mu^2} - y^2 \frac{h}{c^2} = 1$

$a = \frac{\mu}{h} \qquad v = \frac{c}{\sqrt{h}}$

$$1 - \cos\beta\cos\gamma = \sin\beta\sin\gamma$$

$$\cancel{1 \geqq \cos\beta\cos\gamma + \sin\beta\sin\gamma \cos a}$$

$$\cancel{1 - \cos\beta\cos\gamma \geqq \sin\beta\sin\gamma}$$

$$\cancel{1} - 2\cos\beta\cos\gamma + \cancel{(1-\sin^2\gamma)(1-\sin^2\gamma)} \geqq \sin^2\gamma\sin^2\beta$$

$$\cancel{1 - \sin^2\beta - \sin^2\gamma} \geqq 0$$

$$(\cos\gamma - \cos\beta)^2 \geqq 0 \qquad \cancel{\cos^2\beta\cos^2\gamma} \geqq \cancel{1} - \sin^2\gamma - \sin^2\beta$$

$$\cancel{1 - \cos\beta\cos\gamma + \sin\beta\sin\gamma}$$

$$2(\log 2 - 1)$$

$$\log 2 - 1 + \frac{(2+1)}{2} + \log \sim 1 - 1$$

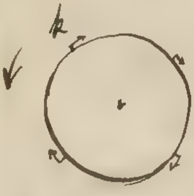
$$m\frac{d^2x}{dt^2} = \frac{mg}{600.000}$$

$$\frac{dx}{dt} = \frac{gt}{600.000} + c$$

$$x = \frac{gt^2}{1.200.000}$$

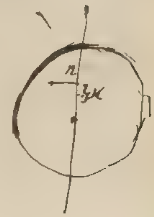
also in einer Woche schon [illegible]
Geschwindigkeit von 10 m
in einem Jahre = 500 m = Gesammte Geschwindigkeit

Einfluss der Rotation



$$\frac{k}{\uparrow} = \frac{\cancel{\quad 47\,12}\ 19}{8 \cdot 2 \cdot 40.000 \cdot 24 \cdot \cancel{36}}$$

$$= \frac{1}{600.000}$$



$$\cancel{\frac{2e^2}{8}\,\mu}\ \frac{d\varphi}{dt^2} =$$

$$= -\frac{\frac{d\varphi}{dt}}{600.000}$$

$$\frac{\frac{d^2\varphi}{dt^2}}{\frac{d\varphi}{dt}} = -\frac{1}{600000}$$

24. 60. 60

36. 4

72

144

86400

$$\lg \frac{d\varphi}{dt} = -\frac{1}{600000}\, t$$

$$\frac{d\varphi}{dt} = e^{-\frac{t}{600000}}$$

$$\frac{4 \cdot 75 \cdot 1000}{60^2}$$

$\varphi = 45^\circ \quad \sin\varphi = \cos\varphi = \frac{1}{\sqrt{2}}$

$$\Delta T_0^{6h} = -\frac{6.60.60}{10.000}\frac{1}{2\sqrt{2}}\left[\sin\delta + \frac{2}{\pi}\cos\delta\right]$$

$$= -\frac{2{\cdot}16}{2\sqrt{2}}\left[\sin\delta + \frac{2}{\pi}\cos\delta\right]$$

Maximum im Sommer = $\frac{1}{\sqrt{2}}$

Mittelwerth : $\Delta T_0^{6h} = -\frac{2}{3}\frac{1}{\sqrt{2}}$ sec $\# \frac{1}{2}$ sec $\quad \frac{2}{\sqrt{2}} = 1{\cdot}4$ sec!

also im halben Tag $\neq 1$ sec!

$\varphi = 90^\circ$ NordPol: (Normaler Werth am Morgen und Abend)

$$\Delta T_0^{6h} = -6^h \frac{f}{2p}\sin\delta$$

$$= -\frac{6.60.60}{10.000}\cdot\frac{1}{2}\sin\delta = \frac{2{\cdot}16}{2}\sin\delta$$

$\neq \sin\delta$

$$\Delta T_0^{24h} = 4\sin\delta$$

$$\Delta T_0^{91t} = \underbrace{4.91}_{365}\ \underbrace{M(\sin\delta)_0^{\varepsilon}}\ \text{sec}$$

$$\frac{1-\cos\varepsilon}{\varepsilon} = \frac{1-\cos 23^\circ 30'}{23^\circ 30'} \Big/ \frac{90^\circ \cdot 2}{\pi}$$

$$= \frac{083 \cdot 188 \cdot 2}{47 \cdot 3}$$

36 :
249
498
2988 : 141 = 0·21
168

$\Delta T_0^{91t} = 365.0{\cdot}21 \qquad \frac{730}{365}$ also in einem Halbjahr

$= 76$ sec $\quad 153$ sec $= 2\frac{1}{2}$ Minuten!

(Normaler Werth im Sommer und Winter)

der Wandkreise täglich zweimal Maximum = 20·6'' in der Richtung, wo Sonne vor einem $\frac{1}{4}$ Jahre auf- und untergegangen war. und zwar nach O um 12^h Nachts $\pm$ ~

W Mittag $\pm$ ~

Componente in der Vertikalen

$$I = f \sin h$$

$$= [\sin\delta \sin\varphi + \cos\delta \cos\varphi \cos t] f \qquad \Bigg\| \quad \tau = \pi\sqrt{\frac{l}{g}} \quad \Delta\tau = \tau\left(\frac{I}{2p}\right)$$

$$\Delta T_{\odot} = \int_0^{\frac{\pi}{2}} dt \left[\frac{f}{2p}(\sin\delta \sin\varphi + \cos\delta\cos\varphi\cos t)\right]$$

$$= -\frac{f}{2p}\left[\sin\delta\sin\varphi \cdot \frac{\pi}{2} + \cos\delta\cos\varphi\right]$$

$$\Delta T_0^{6h} = -\frac{6^h}{\frac{\pi}{2}} \frac{f}{2p}\left[\frac{\pi}{2}\sin\delta\sin\varphi + \cos\delta\cos\varphi\right]$$

$$= -6^h \frac{f}{2p}\left[\sin\delta\sin\varphi + \frac{2}{\pi}\cos\delta\cos\varphi\right]$$

v. $\varphi = 0$ Äquator

$$\Delta T_0^{6h} = -\frac{6^h}{10.000}\frac{1}{2}\frac{2}{\pi}\cos\delta$$

Maximum Äquinoctien

$$= -\frac{6.60.60^{sec}}{10.000}\frac{1}{\pi}\cos\delta = -\frac{2·16}{3·14}\cos\delta = -\frac{2}{3}\cos\delta^{sec}$$

$$H^2\{\underbrace{\cos^2 A\cos^2\varphi+\sin^2\varphi}\}+2f\cos A\cos\varphi\sin\delta\cdot H$$

$$=f^2(\sin^2\varphi-\sin^2\delta)$$

$\cos^2 A\cos^2\varphi+1-\cos^2\varphi$

$=1-\cos^2\varphi\sin^2 A$

$$H^2+2H\frac{f\cos A\cos\varphi\sin\delta}{1-\cos^2\varphi\sin^2 A}=f^2$$

$$H=-\frac{f\cos A\cos\varphi\sin\delta}{\cos^2 A\cos^2\varphi+\sin^2\varphi}\pm\sqrt{\frac{f^2(\sin^2\varphi-\sin^2\delta)}{\cos^2 A\cos^2\varphi+\sin^2\varphi}+\frac{f^2\cos^2 A\cos^2\varphi\sin^2\delta}{(\quad)^2}}$$

$$=\frac{-f\cos A\cos\varphi\sin\delta\pm\sqrt{f^2(\sin^2\varphi-\sin^2\delta)(\cos^2 A\cos^2\varphi+\sin^2\varphi)+f^2\cos^2 A\cos^2\varphi\sin^2\delta}}{\cos^2 A\cos^2\varphi+\sin^2\varphi}$$

Bewegungs Richtung dort, wo Sonne vor einem Vierteljahr, um 6 Stunden später war. Somit für alle Punkte innerhalb

Componente welche in die Horizontale fällt:

$H = f \cos h$ $\quad \Big[\, \sin h = \sin\delta \sin\varphi + \cos\delta \cos\varphi \cos t$

$$\cos A = \frac{-\sin\delta + \sin h \sin\varphi}{\cos h \cos\varphi}$$

$H = fc.(A)$.

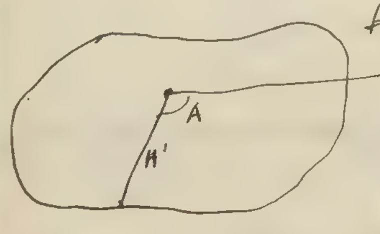
$$\cos h = \frac{H}{f}$$

[illegible]

$$\cos A = \frac{-\sin\delta + \sin\varphi \sqrt{1 - \frac{H^2}{f^2}}}{\frac{H}{f}\cos\varphi}$$

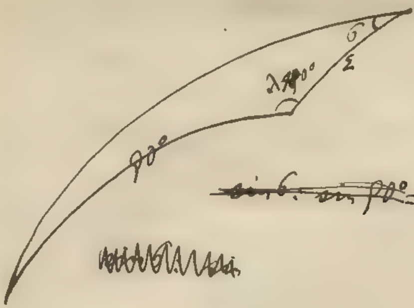
$$\cos A = \frac{-f\sin\delta + \sin\varphi\sqrt{f^2 - H^2}}{H\cos\varphi}$$

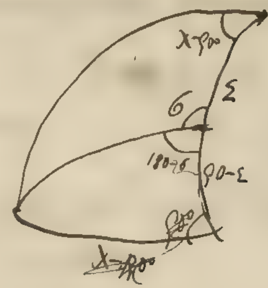
$$\cancel{H^2 \cos^2 A \cos^2\varphi = f^2 \sin^2\delta + \sin^2\varphi f^2 - H^2 \sin^2\varphi}$$



$\cos A \cos\varphi . H + f \sin\delta = \sin\varphi \sqrt{}$

$f^2 \sin^2\delta + \cos^2 A \cos^2\varphi . H^2 + 2 f \cos A \cos\varphi \sin\delta . H = \sin^2\varphi . f^2 - \sin^2\varphi . H^2$

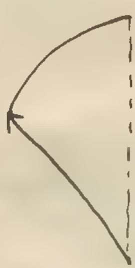




$$\operatorname{tg}(180-\sigma) = \frac{\operatorname{tg}(\lambda-90^\circ)}{\sin(90-\varepsilon)}$$

$$\operatorname{tg}\sigma = -\frac{\operatorname{tg}\lambda}{\cos\varepsilon}$$

$$\sphericalangle\ N_p Z = 180-\vartheta+(\sigma)_{90}$$

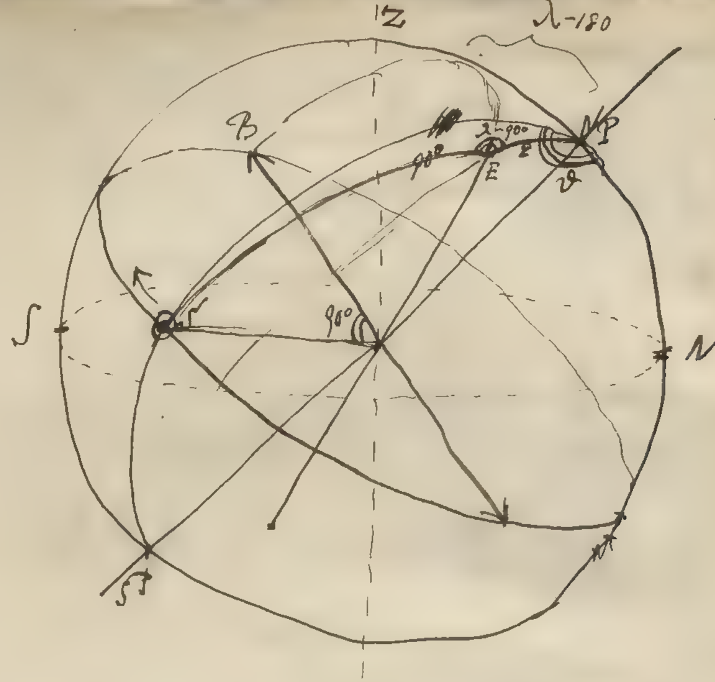


der Bewegung dorthin, wo Sonne wäre, wenn ihre Länge um 90° kleiner wäre, ~~[illegible]~~ für

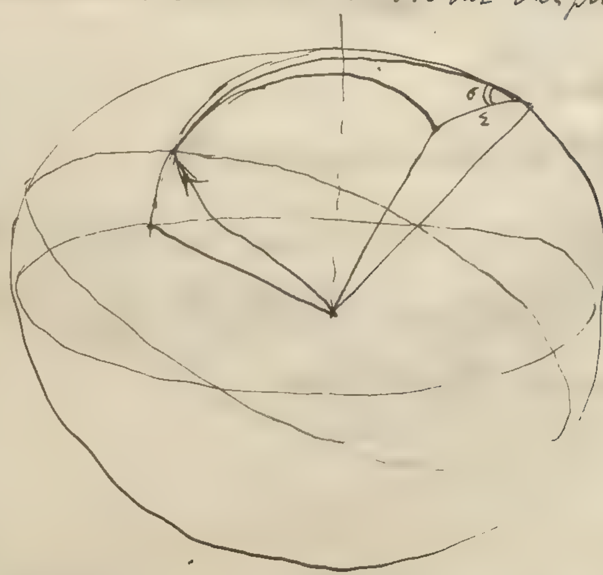
$\sin h = \sin\delta\sin\varphi + \cos\delta\cos\varphi\cos t$ ‖ $t =$ von 12^h Mittags gerechnet

$\sin\delta = \sin\lambda\sin\varepsilon$

$$\cos A = \frac{-\sin\delta + \sin h\sin\varphi}{\cos h\cos\varphi}$$



Bewegungs Richtung der Erde ist senkrecht auf eine Ebene welche durch die Sonne und den Pol der Ekliptik gelegt wird.



~~Zur Hypothese des~~

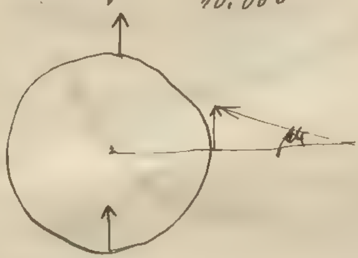
Zur Ätherstoss-Theorie.

I. In Bezug auf Revolution der ♁; Rotation = 0.

$$f = m g \frac{v}{V}$$

[Centralpunkt = ♁
[illegible]
[illegible]]

$$= p \cdot \frac{v}{V} = \frac{p}{10.000}$$



$$\operatorname{tg} \mu = \frac{1}{10.000}$$

$$\mu = \frac{360 \cdot 60 \cdot 60 \cdot 3}{\pi \cdot 10.000}$$

$$648 : 31{,}4 = 20{,}6$$
20

$$\mu = 20{,}6''$$

halbe

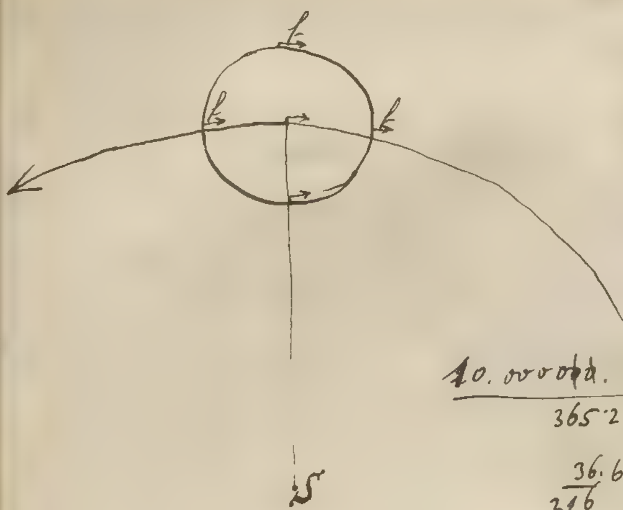
also im Laufe eines Tages Änderung der Verticalen um ca 40" !!

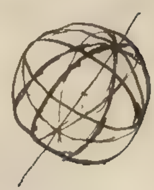
A) Äquinoctien:

~~für alle Orte der Erde ..."~~

Berechnung der Richtung der momentanen Erdbewegung für beliebigen Punkt unter geogr. Breite = φ; bei Sonnenlänge = λ (Datum), und Stundenwinkel ϑ (seit 12h Nachts);

40.000 g h = V



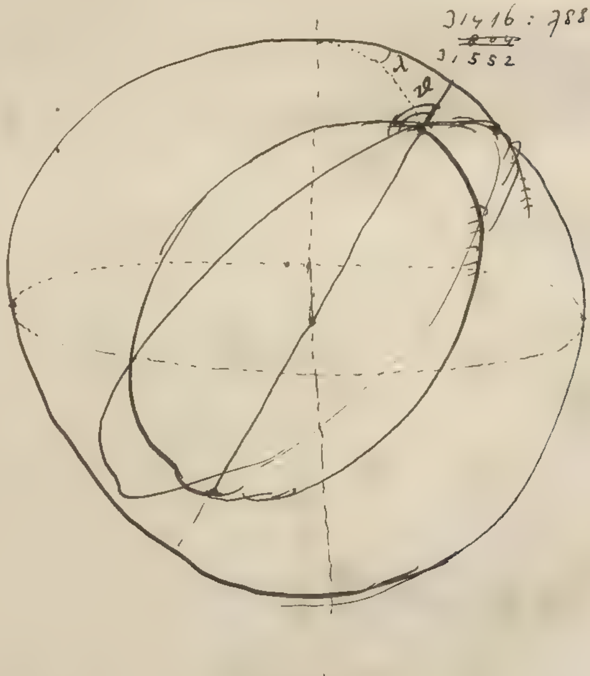


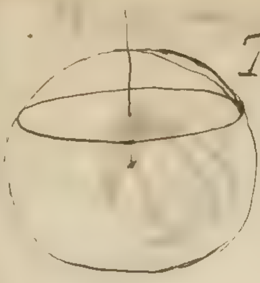
40.000000 . 4.2
365.2 . ~~24~~ 60 . 60
6

36.6
216

7304
365
219
7888

31416 : 7888 = 4 − 0.02
~~800~~
31552





$$\cancel{T = 2\pi \int_0^{\pi} \int_0^{a} r^3 \, dr \, d\varphi \sin^2\varphi}$$

$\cos 2\varphi = 1 - 2\sin^2\varphi$

$\sin^2\varphi = \frac{1-\cos 2\varphi}{2}$

$$= \frac{2\pi a^4}{4} \int_0^{\pi} \sin^2\varphi \, d\varphi$$

$2\varphi = -\vartheta$

$$\cancel{\frac{1}{4}\int_0^{2\pi} d\varphi - \frac{1}{4}\int_0^{\pi} \cos\vartheta \, d\vartheta}$$

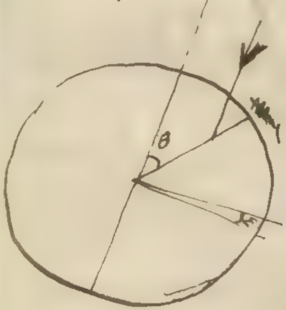
$$= \frac{a^4\pi^2}{4}$$

$$T = 2\pi \int_0^{\pi} \int_0^{a} r^4 \, dr \, d\varphi \sin^3\varphi$$

$$= \frac{2\pi a^5}{5} \int_0^{\pi} \sin^3\varphi \, d\varphi$$

$$\int_0^{\pi} \left[\sin\varphi - \sin\varphi\cos^2\varphi\right] d\varphi = -\cos\varphi + \frac{\cos^3\varphi}{3}\Big|_0^{\pi} = \frac{4}{3}$$

$$T = \frac{8\pi a^5}{15} = M \cdot \frac{2a^2}{5}$$



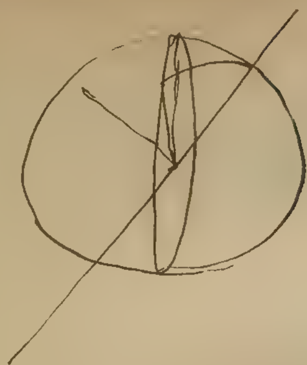
$$\frac{g}{10{,}000} \cdot M = K$$

$$M g \frac{v}{V}$$

$$\cancel{MR}\frac{d^2\varphi}{dt^2} = \cancel{M} g \frac{\cancel{R}}{V} \frac{d\varphi}{dt}$$

$$\log \frac{d\varphi}{dt} = g\frac{t}{V} + \text{Const}$$

$$\frac{d\varphi}{dt} = C e^{-g\frac{t}{V}} \qquad \varphi = C' e^{g\frac{t}{V}} + C$$



$\frac{2}{3}$ 0·917 + 0·399

tg $\varepsilon = \frac{1}{10000}$ ‖ $1^\circ = \frac{1}{60}$

$\frac{6 \cdot 60 \cdot 60}{10000} \cdot 4$ 144 / 14 sec

$\varepsilon = \frac{6}{1000} = \left(\frac{1}{167}\right)^\circ = \left(\frac{1}{2 \cdot 5}\right)' = 20''$

$20''$

$1^\circ = 4^m$
$1' = 4^s$
$20'' = \frac{4}{3}^s$

$\frac{1}{390000000}$

$= 500000 : 25 = 20000^t$

$=$

$t = \frac{10{,}030.000}{2}$

immer — äusseren Druck bei jedem Körper

Capillaritätsconstante derselben bestimmen dP ...

... etc.

$1+\mathfrak{D}\cos\varphi = x$ $\quad \cos\varphi = \frac{x-1}{\mathfrak{D}}$ $\quad \sin\varphi = \frac{\sqrt{\mathfrak{D}^2-(x-1)^2}}{\mathfrak{D}}$

$-\mathfrak{D}\sin\varphi\, d\varphi = dx$

$$d\varphi = \frac{-dx}{\sqrt{\mathfrak{D}^2-(x-1)^2}}$$

$$\frac{1}{1+\mathfrak{D}\cos\varphi} = x$$

$1 = x + \mathfrak{D}x\cos\varphi$

$$\cos\varphi = \frac{1-x}{\mathfrak{D}x} \qquad \sin\varphi = \frac{\sqrt{\mathfrak{D}^2x^2-(1-x)^2}}{\mathfrak{D}x}$$

$$\frac{-\mathfrak{D}\sin\varphi\, d\varphi}{(1+\mathfrak{D}\cos\varphi)^2} = dx$$

$$J = -\int \frac{x\,dx}{\sqrt{(\mathfrak{D}^2-1)x^2+2x-1}} = \frac{-1}{\mathfrak{D}^2-1}\sqrt{(\mathfrak{D}^2-1)x^2+2x-1} + \frac{1}{\mathfrak{D}^2-1}\int\frac{dx}{\sqrt{}}$$

$$= \frac{1}{2\sqrt{\mathfrak{D}^2-1}} \lg \frac{2+2(\mathfrak{D}^2-1)x+2\sqrt{}}{2+4(\mathfrak{D}^2-1)x+2\sqrt{\mathfrak{D}^2-1}\sqrt{(\mathfrak{D}^2-1)x^2+2x-1}}$$

$$\sqrt{} = \sqrt{\frac{\mathfrak{D}^2-1}{(1+\mathfrak{D}\cos\varphi)^2} + \frac{2}{1+\mathfrak{D}\cos\varphi} - 1}$$

$$= \frac{\mathfrak{D}^2-\cancel{1}+\cancel{2}+\cancel{2\mathfrak{D}\cos\varphi}-\cancel{1}-\cancel{2\mathfrak{D}\cos\varphi}-\mathfrak{D}^2\cos^2\varphi}{(1+\mathfrak{D}\cos\varphi)^2}$$

$$= \frac{\mathfrak{D}\sin\varphi}{1+\mathfrak{D}\cos\varphi}$$

$$J = \frac{1}{1-\mathfrak{D}^2}\,\frac{\mathfrak{D}\sin\varphi}{1+\mathfrak{D}\cos\varphi} + \frac{1}{2(\mathfrak{D}^2-1)^{\frac{3}{2}}} \lg \frac{1+\frac{\mathfrak{D}^2-1}{1+\mathfrak{D}\cos\varphi}+\frac{\sqrt{\mathfrak{D}^2-1}\cdot\mathfrak{D}\sin\varphi}{1+\mathfrak{D}\cos\varphi}}{1+\quad-}$$

$$\frac{\cancel{1}+\mathfrak{D}\cos\varphi+\mathfrak{D}^2\cancel{-1}+\mathfrak{D}\sqrt{\mathfrak{D}^2-1}\sin\varphi}{\cos\varphi+\mathfrak{D}-\sqrt{\mathfrak{D}^2-1}\sin\varphi}$$

$$\frac{v_A^2}{2} - \frac{\mu}{r_0} = 0$$

$$v_A^2 = \frac{2\mu}{r_0}$$

$$r_0 = \frac{2\mu}{v_A^2} = \frac{2\rho v_0^2}{\sqrt{2}\, v^2} = \sqrt{2}\,\rho\,\frac{v_0^2}{v^2}$$

$$\frac{\rho v_0^2}{\sqrt{2}} = 2k\rho^2 \tfrac{4}{3}\pi s$$

$$k = \frac{v_0^2}{10\,\rho^2}$$

$$n^2 \frac{1}{n^2} k\left[1 + \frac{1}{2^2} + \frac{1}{3^2} + \cdots\right.$$
$$+ \frac{1}{2^2} + \frac{1}{3^2} \cdots$$
$$+ \frac{1}{3^2} + \cdots$$
$$+ \cdots$$

$$\frac{B^2 - 1 + B - [B^2 + 2B]\cos\varphi}{(1 + B\cos\varphi)(1-\cos\varphi)} = \frac{(B^2+2B)\sin\varphi}{(1+B\cos\varphi)(1-\cos\varphi)} \frac{[B^2-1+B-(B^2+2B)\cos\varphi]}{(1+B\cos\varphi)^2(1-\cos\varphi)^2}$$

$$\underbrace{[(1+B\cos\varphi)\sin\varphi - B\sin\varphi(1-\cos\varphi)]}_{2B\cos\varphi\sin\varphi}$$

$$= \frac{(B^2+2B)(1+B\cos\varphi)(1-\cos\varphi) - [B^2-1+B-(B^2+2B)\cos\varphi]\,2B\cos\varphi}{(1+B\cos\varphi)^2(1-\cos\varphi)^2} B\sin\varphi$$

$$2 + B\cos\varphi - 2\cos\varphi - 2B\cos^2\varphi$$
$$+ B + B^2\cos\varphi - \cancel{B\cos\varphi} - B^2\cos^2\varphi - \cancel{\cdots}$$

$$= 2 + B\,\cancel{\cos\varphi[\cdots]} - \cos\varphi + \cos^2\varphi\,[\cancel{2B - B^2 + (B^2 + 2B)}]$$

$$\frac{(B + 2 - \cos\varphi)}{(1 + B\cos\varphi)^2(1-\cos\varphi)^2} B\sin\varphi$$

[illegible]

[illegible]

Programm

der [illegible] Zusammenkunft

1) „Soldaten Geist“ [illegible] Marsch

2) [illegible] Dichter [illegible] [illegible]

[illegible]

3) „Eine bekannte Geschichte“ [illegible]

4) „Airs variés“ für [illegible] [illegible]

5) [illegible] [illegible] [illegible]

6) [illegible] [illegible] [illegible] [illegible]

7) [illegible] [illegible]

8) „[illegible] Lied“ [illegible] [illegible]

[illegible]

9) „Ein [illegible]“

[illegible]

10) „Arabische Tänze“ für [illegible]

[illegible]

11) [illegible] [illegible]

12) „[illegible]“ [illegible]

13) „[illegible]“

14) „[illegible] Marsch“ [illegible]

Wien am 11. April [illegible] Anfang [illegible]

Louis Lenanjene 5